TORREYA

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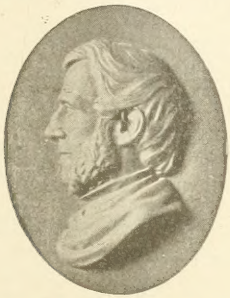

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THE *PALA* OR MULE'S-FOOT FERN (*Marattia Douglasii* (Presl.) Baker) IN THE HAWAIIAN ARCHIPELAGO

By Vaughan MacCaughey

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The Hawaiian ferns have constituted an interesting subject of botanical investigation for over a century. There have been few studies, however, of specific ferns or fern groups.[1] The present paper aims to give a concise account of the "mule's-foot" fern or *pala* (*Marattia Douglasii* (Presl.) Baker). This species is of particular interest because it is the sole representative, in the present Hawaiian flora, of an extremely important group of pteridophytes, namely, the Marattiales. Moreover, it also occurs in the Fiji Islands, and this fact raises some interesting questions as to its geographic dissemination. The *pala* was also used as food and medicine by the primitive Hawaiians. Finally, Campbell's[2] studies of the gametophyte stage have given local workers a special interest in this fern.

In early geologic periods Marattiaceous ferns abounded, and comprised an important element in the luxuriant fern jungles of those times. They were very abundant in the Pennsylvanian (Upper Carboniferous), in the Triassic (Rhetic), and in the Mesozoic of India. A survey of the geological record shows that the present-day Marattiales are but scant and skrunken remnants of a magnificent vanished flora.

The ancient and primitive family Marattiaceae is represented

[1] MacCaughey, V. Genus Gleichenia in the Hawaiian Islands. Torreya **18**: 41–52. 1918.

[2] Campbell, D. H. Observations on the development of *Marattia douglasii* Baker. Ann. Bot. **8**: 1. 1894.

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in the Hawaiian flora only by a single species, *M. Douglasii.* The geographic range of the family is indicated by the following table:

Genus	No. of species	Range
Marattia	25	tropics
Angiopteris	1 (or 60!)	Old World tropics, Australasia, S. Japan
Archangiopteris	1	southwestern China
Kaulfussia	1	Indo-Malaya, Philippines
Macroglossum	1	Borneo
Danaea	20	Tropical America

From this table will be seen that Hawaii, isolated in the vast stretches of the North Pacific Ocean, and lying on the rim of the tropics, is the northernmost limit of the family's range in the entire Pacific basin.

Three theories may be presented to explain the occurrence of *M. Douglasii* in the Hawaiian Islands. First: It also occurs in the Fiji Archipelago. Inasmuch as the bulk of the native Hawaiian flora shows affinities with that of the southwest Pacific, it is possible that the *pala* was introduced through natural agencies,—ex. wind,—from the South Pacific. Second: The native Hawaiians habitually used the *pala* for food and medicine. The natives originally migrated to Hawaii from Tahiti, and for many centuries maintained intercourse with their southern kinsfolk. During this period of migration and intercourse, numerous food plants[1] were introduced into Hawaii. It is not at all unlikely that the *pala* was deliberately introduced, by the natives, during this epoch. Its present distribution in the islands is in no way incompatible with this hypothesis.

Third: The entire Hawaiian Archipelago has undergone profound subsidence during recent geologic time.[2] In early times the islands were united by land connections. This formed a "Pan-Hawaii-land," very much larger in area, higher in elevation, and diversified in topography and climate, than the present archipelago. On the warm lowlands of Pan-Hawaii-land may have existed great tropical jungles of Marattiaceous ferns and

[1] MacCaughey, V. Food Plants of the Ancient Hawaiians. Sci. Monthly 4: 75–80. 1917.

[2] MacCaughey, V. Outstanding Biological Features of the Hawaiian Archipelago. Amer. Nat. in press.

their allies. All have vanished save the lone *M. Douglasii*, that was able to survive under the changing ecologic environment. There is ample evidence elsewhere in the Hawaiian flora to show that many elements of the present flora are but remnants of the far richer flora of Pan-Hawaii-land.

The genus *Marattia* Sm. (—*Dicostegia* Presl., *Eupodium* J. Sm., *Gymnotheca* Presl., *Marattia* Presl., *Myriotheca* Bory, *Stibasia* Presl.) was named in honor of an Italian botanist, J. F. Maratti, of Vallombrosa, Tuscany, who lived in the seventeenth century and wrote on ferns. The genus comprises about 25 species, which are scattered throughout the tropics, and into the southern hemisphere. The following table shows the distribution of the better-known species.

Old World

African

fraxinea Sm.—west coast of Africa to Polynesia.
salicifolia Schrad.—South Africa to the Cape.
Boivini Mett.—Madagascar.
purpurascens de Vriese—Ascencion Island.

East Indies

salicina Sm.—East Indian Archipelago.
sambucina Bl.—Java.
pellucida Presl.—Philippine Islands.

Melanesia

melanesiaca Kuhn—Melanesia.
attenuata Labill—New Caledonia.

Polynesia

Douglasii (Presl.) Baker—Fiji, Hawaiian Islands.

New World

cicutifolia Kaulf.—tropical America.
Kaulfussii J. Sm.—tropical America.
alata Sm.—West Indies, Mexico, northern South America.
Weinmanniifolia Liebm.—Mexico.
laevis Sm.—West Indies.

Marattia Douglasii (Presl.) Baker[1] is called *pala* by the Hawaiians. It may also be called the Mule's-foot Fern, or Douglas's Marattia. It was named in honor of the Scotch botanist, David Douglas, who visited Hawaii in 1833, and lost his life by falling into a native cattle-trap.

It is a large, coarse-leaved, showy fern, easily recognized in the forest. Although not as large as the Marattias of other countries, it attains generous size, with a stocky trunk 1–2 ft. high, and wide-spreading leaves, 6–15 ft. long. In Hawaii Marattia is surpassed in stature and spread by some of the arborescent species (*Cibotium*, *Sadleria*[2]). Aside from the strictly arborescent species, however, *Marattia* and *Angiopteris* may be ranked among the largest of the ferns.

The *pala* is abundant in the mountain-forests of Hawaii, and in the moister parts of the lower forests. It inhabits the humid zone lying between 800–3500 ft., on both windward and leeward slopes. It favorite haunts are cool, heavily shaded, humid, steep-sloped ravines, where it forms little colonies or patches. It seems to prefer sharply sloping banks and ravine-sides, although it is also found in level places. The *pala* is strongly hygrophytic and shade-loving; it is never found in dry or exposed situations.

Representative regions where the *pala* is abundant are: Hanalei and Na Pali districts, Kauai; Kaala and Punaluu districts, Oahu; valleys of northeastern Molokai; mountains back of Lahaina and Wailuku, Maui; forests of windward Haleakala, Maui; forests of Hilo, Hamakua, Olaa, and Kona, Hawaii. There are no places where it is excessively abundant; it is scattered rather sparingly through the forests and groves.

The stem or trunk is tuberous, barrel-shaped, or almost globular. It is stocky and erect, as is also true of *Angiopteris*. *Danæa* and *Kaulfussia* have more or less horizontal rhizomes. The *pala* stem is sometimes half buried under leafmould and earth, but on the steeper slopes, where the *pala* best luxuriates, it is almost wholly exposed.

[1] W. J. Hooker and J. G. Baker. Synopsis Filicum. London, 1868, p. 441. Also called *Stibasia Douglasii* Presl., *Gymnotheca Douglasii* T. Moore, *M. alata* Hook. & Arn.

[2] MacCaughey, V. Tree Ferns of Hawaii. American Botanist, **22**: 1–9. 1916.

The stem is completely covered by the conspicuous, dark, fleshy auricles (stipules) and leaf-bases. The petioles arise from among the brownish or purplish auricles. After the fall of the leaf the fleshy base remains alive and often gives rise to adventitious buds. Hooker, in describing the stipules of *M. purpurascens* De Vriese states that they may become "leafy at the margin, lobed and crestd, green, sometimes even becoming soriferous pinnules." The leaf-bases of the *pala* have been well described by Camptell:[1]

"The leaves are furnished at the base with very conspicuous fleshy stipules which remain adhering to the stem after the leaf has fallen away, and these leaf-bases, with their attached stipules, more or less completely cover the surface of the stem. As the leaves fall away they leave a characteristic scar marked by the remains of the vascular bundles. The leaf-base as well as the stalks of the leaflets show a more or less marked enlargement, recalling the pulvinus which occurs so commonly in the Leguminosae. It is at this point that the leaf-stalk separates, the smaller divisions of the leaf often breaking away from the main or secondary rachis, in the same fashion as the main leaf-stalk falls. In the large species of *Marattia* and *Angiopteris* this enlarged leaf-base with the two thick, fleshy stipules curiously resembles in shape and size the hoof of a horse."

The present writer would suggest that the comparison with a mule's hoof would be more apt, and proposes as the common name, "MULE'S-FOOT" FERN.

The thick, fleshy auricles are richly supplied with starch and mucilage, and were used by the primitive Hawaiians as an article of food, when other food supplies were lacking. The "mule's feet" were baked in hot ashes, whereupon they became very palatable. The writer has frequently eaten baked *pala*, and can testify to its excellence. The *pala* stipules were also used medicinally, for bronchial and intestinal catarrh. Slices soaked in cold water soon impart their mucilage to the liquid, and form a pleasant drink.

In cross section the starchy, watery stem shows a complicated system of steles, arranged in concentric circles. Sclerenchyma is absent from its ground tissue.

[1] D. H. Campbell. The Eusporangiatae, 1911, p. 118.

The *pala* roots are short, thick, and fleshy. They originate with reference to the stele circles in the stem. The central cylinder of the root has several alternating groups of xylem and phloem. Tannin sacs are abundantly developed in the roots, as well as in other parts of the plant.

The *pala* foliage is stately and somber. The leaves are few in number (5–150), spirally arranged, and with close-set bases. The young leaves are enclosed in the prominent stipules; the leaves are circinate, and slowly unfurl in the typical fern manner. The leaves develop very slowly,—a period of 3 to 6 months being required for the unfurling of a single leaf. Indeed, all of the vital functions of the *pala*, like those of other rain forest plants, are very sluggish.

The petioles are 3 to 5 feet long, stout, smooth, and shining. At the base they are conspicuously swollen, articulate, and 2.5–3 ins. in diameter. The "mule's-foot" base, with its two large, fleshy, auricular stipules, has already been described. Lenticel-like structures are of common occurrence on the older leaf-bases. They arise beneath the stomata, and form small cavities, the peripheral cells of which become detached and dried up. Large mucilage ducts and numerous tannin sacs are developed in the petioles of the older leaves.

The leaf-blade is 3 to 8 ft. long, deltoid or ovate-oblong, and 2–3-pinnate. The base is 3-pinnate; there is a terminal pinnule. The blade is a characteristic dark green, smooth, glossy, and notably fleshy. The color and texture are quite distinctive. A cross-section of leaf reveals a thick layer of collenchymous hypodermal tissue.

The pinnae are oblong-lanceolate. The lowest pinnae are 6–24 in. long, on stalks of .5–2.5 in. The upper portion of the rachis is narrowly margined or winged. The secondary pinnae are linear, 3–6 in. long, with a broadly compressed or winged rachis. The ultimate pinnules are substipitate, ovate or oblong, .5–1 ins. long by .25–.30 in. wide, and bluntly serrate. The apex is obtuse or acuminate; the base is cuneate or subtruncate. The veins are simple or dichotomously forked.

All the leaves are spore-bearing or potentially so. The spor-

angia are large, fleshy, and borne in boat-shaped groups (synangia), on the under surface of the pinnule, near the margin. The sporangia, each of which arises from a number of superficial cells, are incompletely separated from one another, and remain together in the oblong or capsule-like synangia. The walls of the sporangium are several cells in thickness. The annulus is wanting or greatly reduced; there is no indusium. The synangium is adnate to the vein, or very short-stalked. Dehiscence is first by the opening of the synangial valve, then slits along each sporangium.

Campbell[1] has made detailed studies of the gametophyte. The spores are very small, bilateral or tetrahedral, and yellowish-brown. Under suitable conditions they germinate promptly. Within a week they begin to show a greenish tint, due to the developing chlorophyll. The mature gametophyte is large, fleshy, massive, dark-green, and heart-shaped. It grows on the surface of the soil and closely resembles such liverworts as *Pellia*. It is broad heart-shaped, tapering to a narrow base. The very old gametophytes branch dichotomously exactly as in the thallose liverworts. "A broad midrib extends for nearly the whole length of the thallus and merges gradually into the wings, which are also several-layered, nearly or quite to the margin"—Campbell. Rhizoids,—brown, unicellular, and thin-walled,—are produced abundantly from the cells of the lower surface.

The gametophyte is monoecious. Antheridia appear first, sometimes on the upper surface, but usually along the lower side of the midrib. The archegonia are confined exclusively to the lower surface of the midrib. Campbell points out that the reproductive organs are very much like those of *Ophioglossum*, and are "marked indications of the primitive nature of these ancient ferns."

The *Marattia* gametophyte is always infested with a specific endophytic fungus. Campbell states that it is probably identical with or very closely related to the fungus which occurs in *Ophioglossum*. "In the infested cells of the green gametophyte the starch and chromatophores are destroyed by the action of

[1] D. H. Campbell. The Eusporangiatae, 1911. Mosses and Ferns, 1905.

the endophyte, but the nucleus of the cell remains intact." The duration of the gametophyte is apparently unlimited, so long as fertilization does not take place. The young sporophyte consists at first mainly of the primary leaf and root, which are traversed by a single axial vascular strand. A stem apex is developed at an early period, although it remains relatively inconspicuous.

The *pala* does not occur in cultivation, to the writer's knowledge. It undoubtedly would grow successfully under humid fern-house conditions, as do many other Hawaiian ferns. *M. fraxinea* Smith, which ranges from west Africa to New Zealand, is cultivated in American conservatories. The Hawaiian *pala* would likewise give a magnificent tropical effect in northern greenhouses. It deserves attention.

PLEISTOCENE PLANTS FROM TENNESSEE AND MISSISSIPPI

By Edward W. Berry

I have published, from time to time, brief accounts of Pleistocene plants from our Atlantic and Gulf states as they have passed through my hands, since the amount of material likely to be available does not warrant a more comprehensive treatment. For this reason I wish to place on record the following new occurrences.

It is to be hoped that the distribution of our floras in the era immediately preceding the present be considered by botanists dealing with the existing flora. Even in the present unsatisfactory state of our knowledge of Pleistocene plants, woefully behind that of other civilized countries, much is to be gained in insight and many pitfalls may be avoided by looking back of the present.

This note relates to small collections made by Bruce Wade in 1915 at Adamsville, McNairy County, Tennessee, from next to the highest terrace of the Tennessee River (elevation about 500 ft.), and by E. W. Shaw from the Loess just west of

Vicksburg Military Park, Warren County, Mississippi (the Bluff formation of Hilgard).

The number of species in these two collections is small and the forms are not especially noteworthy in that they do not occur outside the existing range of the forms involved. The hackberry (*Celtis mississippiensis*) is recorded for the first time from the Pleistocene; Lesquereux's old determination of the chinquapin from the banks of the Mississippi River is in a measure corroborated by finding it fossil in western Tennessee; and the range of the Pleistocene ancestor of the spanish oak is considerably extended. Following are the species recognized with brief annotations:

OSMUNDA (?) sp.

Based upon rootstocks collected by Mr. Wade at Adamsville. Similar remains, likewise referred to Osmunda, were described by Hollick[1] from the late Pleistocene (Talbot formation) of Maryland, and the foliage of *Osmunda spectabilis* Willd. occurs in the Pleistocene of Alabama.[2]

QUERCUS PREDIGITATA Berry.

This form, the supposed ancestral type of the existing *Quercus digitata* and *Quercus pagodaefolia*, has been recorded previously from the Pleistocene of North Carolina,[3] Mississippi,[4] and Virginia.[5] It is represented at Adamsville by leaves, cupules and acorns, thus considerably extending its known range.

CASTANEA PUMILA Miller.

The small chestnut or chinquapin has been recorded by Knowlton[6] from the Pleistocene near Morgantown, West Virginia, and by Lesquereux[7] from the early Pleistocene near Columbus, Kentucky. Although I have collected materials from Lesquereux's locality and adjacent outcrops[8] I did not meet

[1] Hollick, A. Md. Geol. Surv. Pleist. 217. *pl. 67. f. 3.* 1906.

[2] Berry, E. W. Am. Jour. Sci. **29**: 391. 1910.

[3] Berry, E. W. Jour. Geol. **15**: 342. 1907.

[4] Berry, E. W. Torreya **14**: 162. 1914.

[5] Berry, E. W. Am. Jour. Sci. **34**: 22. *f. 4, 5.* 1912.

[6] Knowlton, F. H. Am. Geol. **18**: 371. 1896.

[7] Lesquereux, L. Am. Jour. Sci. **27**: 365. 1859.

[8] Berry, E. W. Proc. U. S. Nat. Mus. **48**: 293–303. *pls. 12, 13.* 1915.

with this species. Nevertheless I see no reason for doubting Lesquereux's determination beyond the fact that he queried it. The present occurrence is based upon characteristic nuts collected by Mr. Wade at Adamsville.

Celtis mississippiensis Bosc.

This species, so far as I know, has not previously been found fossil. The present occurrence is based upon beautifully preserved, reticulate surfaced stones collected from the Loess at Vicksburg, Mississippi, by E. W. Shaw at a horizon 10 feet below the surface. The related *Celtis occidentalis* Linné is represented by stones in the late Pleistocene (Talbot formation) at Tappahannock, Virginia.[1]

The Johns Hopkins University.

NOTES ON LYCASTE

By T. D. A. Cockerell

Among the various neotropical orchids, few are more attractive than the species of *Lycaste*. Several years ago Mrs. Cockerell brought three forms from Guatemala, and we have had abundant opportunity to study their characters, as they flowered each season in the greenhouse. The plants were purchased in Guatemala City, but were brought from the surrounding country by the natives. The most interesting and beautiful is the one known in horticulture as *Lycaste Skinneri* var. *alba*. After comparing the living plants with typical *L. Skinneri*, flowering at the same time, I came to the conclusion that the so-called variety *alba* was a distinct species. It apparently occurs wild, and in spite of assertions to the contrary, it certainly has structural as well as color characters. The lateral lobes of the lower petal or lip are much larger in *Skinneri* than in *alba*; while the bract of *Skinneri* is much shorter, not reaching the middle of the upper sepal. I wrote to Mr. R. A. Rolfe concerning the matter, and he discussed the question briefly in Orchid Review, 1915, p. 224. He did not believe that *alba* could be a distinct species, and I

[1] Berry, E. W. Am. Nat. **43**: 435. 1909.

hesitated to combat his opinion, although he presented no decisive evidence. As no more light has come to clear up the matter, and it still seems to me at least probable that the white form should be separated, I offer a brief description from our material.

Lycaste **alba** sp. nov.

Scapes light green, 4.25 mm. thick; posterior bract sheathing, the sides infolding, so that the long apical part is hollow, apex tapering, sharply pointed, base 10.5 mm. wide, the back very obtusely keeled, length of bract about 72 mm., light green; anterior bract represented by a small projection about 2 mm. long, pointed with a membranous appendage; sepals pure white, upper erect, about 75 mm. long and 36 broad, lanceolate ovate, obtusely pointed, keeled beneath apically; lateral sepals similar, faintly greenish apically beneath, about 77 mm. long and 38 broad, meeting below and slightly overlapping to form a gibbous chin; the upper sepal goes 24 mm. beyond tip of bract; petals pure white, the lower one (lip) suffused with orange at extreme base; lateral petals about 50 mm. long and 30 broad, the broad apices curled over backward; lip with a broad downwardly directed median lobe, lateral lobes hardly developed, basal part bulbous; column with anthers about 28 mm. long, very stout, the rounded apex very faintly suffused with purplish; the four pollinia bright orange, on a clear white stalk; callus of lip very thick, about 7.5 mm. broad, suboval, pale orange tinted. The flowers are not sticky or aromatic.

In addition to the above and the true *L. Skinneri* Lindley, we have *Lycaste cruenta* Lindley, belonging certainly to a distinct section of the genus. The sepals are very sticky on the outer side, and the flowers have a strong aromatic odor. It is also peculiar in that one of each pair of pollinia is about a third smaller than the other. The following description of the flower is from life:

Lycaste cruenta Lindley

Scapes about 14 cm. long; bracts 4–5, dark red brown, sheathing, loose, pointed, uppermost about 22 mm. long; flowers erect, about 40 mm. long, brilliant orange, with the broad sepals pale yellow-green; sepals about 50 mm. long and 24 broad, oblong, rather obtusely pointed, bearded at base within; petals shorter than sepals, more ovate, with a larger apical angle, lightly speckled with crimson at base; lip abundantly spotted with crimson

within, but the extended, downwardly curved median lobe not speckled, its apical margin slightly irregularly crenulate but not fimbriate; column about 16 mm. long and 7.5 broad, flattened, but thick, dark crimson at base, the contiguous part of the lip also crimson, and the at base of the lip on the outer side is a transversely elongate crimson patch.

SHORTER NOTES

Plants in flower in the Autumn of 1918 on Long Island, N. Y.—Weather Bureau records confirm the observations of everyone that October was the warmest ever known in this vicinity. Certain days of almost summer heat were warmer than any October day for as far back as the records go. It is probably due to these unseasonably warm October days that the following list of plants in fresh flower on October 28–30, and November 1–2, can be recorded.

Plants in fresh bloom at Garden City, L. I., on October 28–30, 1918:

Trifolium pratense	Solidago juncea
" repens	Brassica sp.
" arvense	Daucus carota
Linaria Linaria	Melilotus alba
Taraxacum Taraxacum	Achillea millefolium
Aster paniculatus	Chrysanthemum Leucanthemum
" dumosus	Neopieris mariana (Nov. 4)
" ericoides	Baptisia tinctoria (Nov. 4)

During a walk from Pine Lawn to Lake Ronkonkoma on November 1–2, with Mr. Norman Taylor, the following were also found in fresh bloom:

Aster ericoides	Houstonia longifolia
" undulatus	Cichorium Intybus
" divaricatus	Taraxacum Taraxacum
" cordifolius	Prunella vulgaris
" novae-angliae	Daucus carota
" lateriflorus	Achillea millefolium
" patens	Chrysopsis mariana
" vimineus	Linaria Linaria
" Tradescanti	Oenothera biennis

Solidago juncea	*Oenothera* muricata
" nemoralis	Melilotus alba
" bicolor	Nabalus sp.
" puberula	Rubus sp.
" rugosa	Erigeron ramosus
" caesia	" canadensis
Ionactis linariifolius	Gnaphalium obtusifolium
Centaurea Jacea	Plantago lanceolata
Trifolium repens	" aristata
" pratense	Chrysanthemum Leucanthemum
" agrarium	Brassica sp.
" arvense	Lepidium
Rudbeckia hirta	Hieracium scabrum
Viola pedata	Polygonella articulata
Verbascum Thapsus	Dianthus Armeria
Persicaria pennsylvanica	Eriocaulon septangulare

William C. Ferguson

Garden City.

Concerning Duplicate Types.—In the extensive array of names compounded with "type," all of which agree in presenting some idea derived from or modifying the meaning of that word, it seems strange that the conception which we taxonomists most often have occasion to designate appears not to have received any mononomial term. I allude to that which some of us have erred in calling "co-type," and to which others, more consistent, have applied the phrase "duplicate type" or "duplicate of type."

In 1905, Dr. A. S. Hitchcock indicated the distinction between duplicate type and co-type. In Science **21**: 832, he defines a duplicate type as a specimen "of the same series or set as the type as indicated by the number or other data," and a co-type as a specimen "cited with the original description in addition to the type specimen." In actual practice, in explaining our application of names, we continually need a short expression for the former—something as simple and easily remembered as the really less important word co-type. To meet this need I suggest the term *isotype*.

The word isotype, compounded from the Greek, means "equivalent to the type." To offset the objection that a duplicate is not necessarily equivalent to the type, indeed too often is quite different, is the fact that it always *should be* the same and so for the purpose of comparison should be its equal in value. Perhaps the best *raison d'etre* which can be urged for a word is its suggestion of an ideal; such a term should emphasize the importance of all duplicates being thoroughly like the type.—Francis W. Pennell.

REVIEWS

Boerker's Our National Forests*

A short popular account of the work of the United States Forest Service on the national forests, by the arboriculturist of the Department of Parks, New York City. The introduction (pp. xiii–xlvii) is followed by four chapters on the creation and organization, the administration, and the protection of the national forests, and the sale and rental of national forest resources. An Appendix of six pages contains a tabular statement of land areas within the national forest boundaries.

The book, well illustrated, brings together in small compass, reliable information on a subject about which every citizen should be intelligent, but which has hitherto been largely inaccessible on account of being widely scattered in Government bulletins and reports. Some of the information will be a revelation to perhaps the majority of readers. For example, we learn (p. 72) that the Forest Service has, since 1911, collected over 175,000 pounds of tree seeds for planting, and that 21 tree nurseries, in 1916, had in them over 37 million young trees to be planted in reforestation work. The average layman, who possesses chiefly misinformation concerning the relation of forests to climate, will profit by reading the author's paragraphs on that subject (pp. 89–92). Those who are still skeptical (and there are many such) as to the practical value of preventive and remedial measures for tree diseases and pests will be enlightened to learn, merely as an illustrative example, that an expenditure of only $3,000

* Our National Forests. By Richard H. Donai Boerker. New York. The Macmillan Co. 1918. $2.50.

for insect control on about 900 acres in the Klamath National Forest, resulted in a saving of timber to the value of over $600,000 (p. 96).

Friends of conservation will be interested to learn (p. 114) that a single issue of a New York Sunday paper consumes the trees on about 15 acres of forest. Apropos of this, one may perhaps be pardoned for questioning the wisdom, or the advantage from any point of view, of using eleven pages (pp. lix–lxix) to repeat in full the legends of the 80 illustrations. The analytical table of contents hardly makes up for the absence of an index. Incidentally it might be remarked that the fringed edges (technical term unknown to the reviewer—chewed would be appropriate) make it necessary to use the carpet sweeper and whisk broom after one has spent an hour with the book.

But the few features that may be noted adversely are minor matters in comparison with the general excellence of the book. It gives a terse and readable survey of the history and activities of the Forest Service, and makes clear the need and value of this work. It will be invaluable as a reference book in all colleges and universities, and in public and private libraries. Both the author and the cause of forestry and conservation are to be congratulated.

C. STUART GAGER.

Harwood's New Creations in Plant Life*

The revised and enlarged reprint of the first edition of W. S. Harwood's "New Creations in Plant Life" reads like a Florida land investment prospectus or a modern version of "The Arabian Nights."

Mr. Harwood tells the story of Luther Burbank and his work with all the enthusiasm, all the veracity, and all the inspiration one expects from one whose years have been devoted to journalistic effort. In Chapter I is recounted the struggles and tribulations of Burbank, the man, toward accomplishing his life's ideal. "Now and again," Mr. Harwood writes, "arose some pseudo-scientific man who, professing unlimited friendship,

* Harwood, W. S. New Creations in Plant Life. 2d ed., Revised and Enlarged. Pp. xviii + 430. Illustrated. The Macmillan Co., N. Y. 1918. Price $2.00.

sought for means to filch the rapidly increasing reputation. Others visited him with the covert purpose of exposing him as a charlatan after inspecting his methods, but, confounded by what they saw, went down the little hedge-bordered walk that leads to his quiet home shamed into silence."

Chapter II details the methods of work of this horticultural wizard. On pages 40 43, a list of some of the miracle-like accomplishments are set forth. Among these are "The improved thornless and spiculeless edible cactus, food for man and beast, to be the reclamation of the deserts of the world"; the union of the plum and the apricot, said to be an impossible accomplishment; a plum with a Bartlett pear flavor; a tree which grows more rapidly than any other tree ever known in the temperate zones of the world; a dahlia with the scent of magnolias, a calla lily with a Parma violet's fragrance, a chestnut tree that bears in eighteen months from seed, an amaryllis with flowers nearly a foot in diameter, a calla with flowers 10–12 inches across, a rare fruit called the pomato, "which grows upon the top of a potato," and so on. This genius, according to Mr. Harwood, so remarkably possessed with horticultural intuition, has bred the pits out from the plum, the bitter tannin from the English walnut, given a trailing-arbutus perfume to the verbena, created new species long thought impossible, taken the horrid thorns off from blackberries, and make them beautifully white in fruit. All these have been accomplished and the "half has not yet been told."

On page 51 is computed the gross financial returns for 160 acres of average farm land for 12 years if planted to one of Burbank's hybrid walnut creations. The sum is $485,000, very nearly half a million. The expenses to be deducted from this in the form of care, taxes, etc., are said to be small. On page 68, a paragraph is devoted to Mr. Burbank's work on the chestnut. Ordinarily, we are told, the chestnut trees raised from seed are from 10 to 25 years old before they bear nuts. Now this was altogether too slow for these modern days, so Mr. Burbank produced a tree that bears nuts when seven months to a year and a half old. The readers of this review, possessing desert properties not accessible to irrigation will be interested in state-

ments of an annual yield per acre of 20 tons of spineless cactus which can be utilized for cattle food. In tropical climates, where the land can be irrigated lightly once or twice, an annual yield of 150–180 tons per acre may be expected. As contrasted with 100 acres alfalfa under the best conditions, the yield of Burbank cactus under equally favorable conditions would be 30 to 40 times, we are told on pp. 390–391. And the best of it all, according to our author, is "that once established, the new cactus may remain for years uncultivated and undisturbed, constantly growing on and adding to its vast store."

To the flower lover, the account of Burbank's work with poppies will surely be of absorbing interest. On page 79, a Burbank poppy is described with flowers, a dozen of which placed one upon another, would effectually conceal a man—seven of these magnificent blossoms placed end to end in a row are as high as a tall man.

The volume is well and quite copiously illustrated and no one interested in flowers, fruits, and plant life in general can help being fascinated and very much impressed with this account of the wonders an untrained and comparatively uneducated man has produced in the plant world through using his intuition.

Orland E. White.

PROCEEDINGS OF THE CLUB

October 30, 1918

The meeting was held in the Morphological Laboratory of the New York Botanical Garden, at 3:30 P.M. There were thirty persons present. Vice-president Barnhart occupied the chair.

The minutes of October 8 were read and approved.

The nomination and election of M. Nishimura, Columbia University, N. Y. City, and Dr. Thos. Owen, Dept. Archives and History, Montgomery, Alabama, followed.

A communication from Prof. J. E. Kirkwood relating to the publication of a paper as one of the *Memoirs* of the Club was read and referred to the Board of Editors for a report.

The scientific program for this meeting consisted of an "Ex-

hibition of a Collection of Flowering Plants and Mosses from North Star Bay" made by Dr. E. O. Hovey on the Macmillan Expedition. Dr. Hovey then gave an illustrated lecture on "Description of the Habitats of the Plants Forming this Collection."

"The collection of plants made by Dr. Hovey at North Star Bay, 78 degrees 30 minutes N. latitude, was exhibited by Mrs. N. L. Britton. It included a few flowering plants, *Arnica alpina*, *Cassiope tetragona*, *Dryas integrifolia*, *Papaver radicatum*, *Ranunculus nivalis* and *Saxifraga oppositifolia*, as well as three dwarf willows, *Salix herbacea, S. groenlandica*, named by Dr. Rydberg, and a larger species of willow still undetermined. Of the flowerless plants, 25 are mosses, 8 are hepatics, five are lichens, and two are fungi, one a *Mycosphaerella*, parasitic on the leaves of one of the willows and the other a mould (*Mucor* sp. ?), which seems to be abundant at North Star Bay. The collections were studied by Dr. Evans, Dr. Andrews, Dr. Seaver, Miss Coker, Mr. Williams and Mrs. Britton. After examining the specimens the Club adjourned to the lecture-room, where Dr. Hovey showed some beautiful views of North Star Bay and its flora, including some excellent photographs of birds and a few of the Esquimaux and their dogs."

Adjournment followed.

B. O. Dodge,
Secretary.

November 12, 1918

The first meeting in the month was held at the American Museum of Natural History. There were twenty-one persons present. Prof. R. A. Harper was elected chairman and called the meeting to order at 8:20 P.M. The usual order of business was dispensed with.

Dr. Geo. E. Nichols delivered the lecture of the evening, the subject being, "The *Sphagnum* Moss and its Use in Surgical Dressings." The speaker first described and illustrated several of the more common species of *Sphagnum* to be found in North America, calling attention to the differences in size, color and general habit existing between species. The marked variation in individuals of the same species was also noted as being due to

climatic or environmental influences. The morphological characters of the stems and leaves were described and the particular features by virtue of which the dried moss is able to absorb such large quantities of water were pointed out. It was shown that dried *Sphagnum* is capable of absorbing as much or more per dry weight as the ordinary absorbent cotton used in making dressings.

The cells of the leaves are of two sorts. The smaller or narrower cells making a network, are green, while lying between the green cells we find much larger, empty cells whose walls are provided with large pores through which water may be absorbed from the outside. These cells are also characterized by thickened bands which serve to strengthen the system.

Numerous specimens of *Sphagnum* were exhibited. The methods by which the moss is harvested, dried, sorted and made into surgical dressings were described.

A number of the various kinds of dressings made with *Sphagnum* or with cotton were shown. The lecture was illustrated with lantern slides. It has been published in part in the *Journal* of the New York Botanical Garden.

Adjournment followed.

B. O. Dodge,
Secretary.

NEWS ITEMS

At the annual meeting of the Club held on January 14 the following officers were elected: *President*, H. M. Richards; *Vice Presidents*, J. H. Barnhart and C. Stuart Gager; *Secretary and Treasurer*, B. O. Dodge; *Editor*, A. W. Evans; *Associate Editors*, Jean Broadhurst, J. Arthur Harris, M. A. Howe, M. Levine, G. E. Nichols, A. B. Stout, and Norman Taylor. Dr. M. A. Howe was elected as the delegate of the club to the Council of the New York Academy of Sciences.

Prefessors Edward W. Berry and J. T. Singewald, Jr., of the Johns Hopkins University are planning to leave in April for a six months trip of geological and paleontological exploration in the Andes. The region that they will cover extends from Peru to southern Chile.

Dr. E. W. Olive, of the Brooklyn Botanic Garden, spent some time during the past summer assisting government and state agents in locating plant diseases and instructing farmers how to combat them. An account of his experiences in part of New York and Virginia was given in a public lecture at the New York Botanical Garden on October 26, and was accompanied by lantern slides illustrating some of the most important and recently introduced diseases. Among these were the nematode disease of wheat found in Virginia and the potato wart disease discovered in Pennsylvania.

We learn from *Science* that Professor F. C. Newcombe of the University of Michigan "has been granted leave of absence for the second half year on the condition that he supply a substitute at his own cost." Professor Newcombe has been at the University since 1890.

Dr. L. T. Knight has been appointed plant physiologist in the division of plant pathology at the Minnesota experiment station.

Barrington Moore, formerly Associate Curator of Woods and Forestry at the American Museum of Natural History, and for sixteen months with the American Expeditionary Force in France, has received his discharge from military duty. Major Moore assisted Lt. Col. H. S. Graves, chief of the United States Forest Service, in organizing the forestsy troops which produced lumber for the A. E. F. Major Moore later had charge of all purchases of wood in France and other European countries for the American Army. At the Baltimore meetings he was elected president of the Ecological Society of America.

Dr. F. W. Pennell, of the New York Botanical Garden, is spending some time at the United States National Herbarium studying the collections made in South America by Dr. J. N. Rose.

The conservatories of the Brooklyn Botanic Garden, which, owing to shortage of coal and consequent crowding of the collections have been closed for over a year, have been reopened.

TORREYA

Vol. 19 February, 1919 No. 2

A BOTANICAL STUDY OF SKUNK CABBAGE, SYMPLOCARPUS FOETIDUS

By Katherine A. Williams

The skunk cabbage is a plant of unusual interest and wide distribution, and although its general growth and morphology are pretty well understood, little has been done in an exact study of the plant. A recent study of its western congener, *Lysichiton Kamtschatcensis*, has emphasized the importance of a detailed investigation of the eastern swamp plant. This study was begun early in the spring of the present year (1918) with a view to makiag known some of the features of the plant which have not been emphasized in previous descriptions of it. In the prosecution of this research, I have been assisted by the helpful suggestions of Prof. John W. Harshberger, under whose direction the work has been prosecuted throughout.

Phytophenology and Distribution

Phytophenology.—The skunk cabbage is one of our earliest forest plants, for records show it blooming even in the late fall, or early winter. According to the records made by Dr. Marion Mackenzie and presented before the Botanical Society of Pennsylvania, flowering specimens have been found as early as November twenty-first. Also when the year is backward for any reason, the flowers have been even as late as March before opening. The average date of first blooming seems to be about the middle of January, as seen from the following table. This year the flowering was somewhat later than usual.

[No. 1, Vol. 19 of Torreya, comprising pp. 1–20, was issued 21 February 1919]

Year	Date of Opening of First Flower
1899	March 8
1900	February 22
1901	February 18
1902	January 27
1903	January 15
1904	January 23
1905	January 18
1906	January 5
1907	January 10
1908	January 1
1909	November 21 (1908)
1918	March 9

Daily more and more flowers open until about the latter part of February and early March when they are at their height. Then the greatest numbers may be found open. Of course the date varies slightly owing to the general weather conditions.

Distribution.—In general the plants are found in the eastern coastal states, although a closely allied species is found throughout the west and is there spoken of as the western skunk cabbage, or *Lysichiton Kamtschatcensis.* It is common around Vancouver. In general, though, *Symplocarpus* is distributed along our eastern states, ranging from Nova Scotia down to Virginia and is also reported by the Gray Herbarium of Harvard University, as having been found in Amur and Japan.

The following table gives in general its distribution.

States	Number of Herbariums Reporting
Canada	2
Maine	3
New Hampshire	2
Vermont	1
Massachusetts	4
Rhode Island	2
Connecticut	4
Long Island	2
New York	3
New Jersey	3
Pennsylvania	2
District of Columbia	1
Maryland	1
Virginia	1

States	Number of Herbariums Reporting
Tennessee	1
Iowa	1
Indiana	1
Ohio	2
Michigan	2
Wisconsin	3
Minnesota	1
Nova Scotia	2
Quebec	1
Amur	1
Japan	1

Symplocarpus, like some other members of the Arum family, grows best with a great deal of moisture. And it is in the swamps, marshes and bogs or stream beds, that these sturdy plants are usually found.

General Study

The skunk cabbage, or *Symplocarpus foetidus*, is really our earliest spring flower.

Odor of Plant.—Knuth in his classification of flower odors describes it as nauseous and of mephitic, or viverrine, type. In another case, I found it described as an odor that combines the skunk, putrid meat and garlic. Still another writer describes it as being a combination of a mustard plaster and raw onions. To me the odor is not especially repulsive. It suggests that of fresh cabbage with a slight suggestion of mustard. To some, however, the smell is quite repulsive.

The odor varies in intensity and quality quite widely. Those plants in which the stamens are ripe seem to have the stronger odor. This is probably due to the greater maturity of the plant at this stage of flowering and it has the added significance of attracting a greater number of insect visitors.

Origin of name.—The origin of its common name is not difficult to ascertain, for on crushing the plant immediately an odor arises something like that of the cabbage with yet a suggestion of the mephitic skunk.

The generic name of the plant, *Symplocarpus* was given to it by Richard Anthony Salisbury, and is derived from two Greek

words συμπλοκή, meaning connection and καρπός, fruit. This is quite appropriate, since the ovaries unite to form a compound fruit. Linnaeus gave us its specific name of *foetidus*. Many scientists use the term *Spathyema*, as given by Rafinesque. A point interesting in regard to its name is that the early Swedish settlers around Philadelphia called it bear-weed, because the bears relished the early green food and feasted on its leaves, which are quite large and conspicuous, like coarse cabbage leaves.

Order and family.—We have heard so much about its disagreeable odor that we hardly realize that it belongs to the same family as our Calla lily, for it is a member of the family Araceae. According to Gray, "they are plants with acrid or pungent juices, simple or compound often veiny leaves and flowers crowded on a spadix which is normally surrounded with a spathe." Other closely allied plants, which we find around here, are the golden club, so common in Jersey ponds and the familiar jack-in-the-pulpit. Neither of these, however, possesses the pungent odor, but the Jack, or Indian turnip, is like *Symplocarpus* in that it has many crystals found in the root, which give it a biting clawing taste.

Early growth

Flower, spathe.—The first signs of the plant are the sessile hood-shaped spathes which come up though the ground early or late in the winter, even when the ground is hard with ice at a foot's depth. The flowers are included in a thick leathery spathe. This in general is like a hood, or even shell-shaped. It is sessile and grows close to the ground. In most instances, it has the same general form, although there is a wide variation in contour, size and coloring. Some of these leaf-like spathes are deeply curved, others stand more erect. Some are found which are double. In this case there seems to be a spathe inside a spathe, the open part of the outer spathe coming against the rounded back of the inner spathe. Also in such cases the innermost spathe seems to have a longer, more leaf-like tip which projects backward and out beyond the outer spathe tip. One plant was found this spring (1918) at South Springfield, Pa., with four double spathes.

The greatest variation is seen in the coloring. Usually this ranges from a deep purplish-red, almost black, to a pale yellowish green. Spathes may be found showing the different colors and a complete gradation shown from the light to the dark. The lighter spathes are rarely ever pure pale green, but more frequently are mottled with the deeper purple. In some instances the inner side of the spathe is deeper colored than the outer. The mottling is such that it closely resembles the flickering lights and shades often seen on the undergrowth, as the sun filters through the leaves of the trees overhead. This frequently makes it hard to find them on the forest floor. Reed suggests that this variation is due to age, the younger blooms being those lighter in color, while those which are darker are the older ones. This did not seem to hold true as regards the plants observed by me. Out of about fifty examined for this peculiarity, withering and decay was not limited to the dark ones alone, but was seen in spathes of all intermediate shades of coloring. Again it was suggested that the water content of the soil might lead to this variation. Some time spent on this study did not seem to prove this to hold true, as two spathes from the same plant, side by side, showed one a deep reddish purple and the other quite pale.

The flowers themselves are crowded together on a short stalk or spadix. They are really quite inconspicuous. It is the spathe that is the attractive portion, as far as coloring and conspicuousness are concerned. The flowers themselves are closely crowded on the spadix, so closely crowded that they hardly appear as individual flowers. The stamens and pistil only are conspicuous. The flower cluster varies in size and in the number of flowers produced. Showing this variation we have the following table.

Size relatively	Size in inches	No. of flowers
Small	5/8″	38
Medium	7/8″	73
Large	7/8″	69
Very large	13/16″	61

The flowers as shown by the figures are closely crowded together. In this case, the spadix of medium size had the greatest number of flowers. And the largest spadix had only 61 flowers.

It is due mostly to this crowding that the flowers have departed somewhat from the usual monocotyledonous habit of having three, or its multiple, in their floral parts. In general the flowers showed four perianth parts. These were almost cuboidal in shape, when pressed close together, and they overlapped each other, making a box-like arrangement. The four stamens have long flat, broad filaments and straw-colored anthers, which protrude beyond the perianth segments. The stamens are arranged opposite the perianth parts. The anthers are two-celled, opening lengthwise and are extrorse and rather free in their movement. The flowers are protandrous, the anthers developing earlier than the pistil. The pistil is unusual in its general structural form. The stigma is three-lobed, the style is cuboidal and the ovary is one-celled.

In a cluster of about 73, some flowers showed a few variations. These were either near the lip or the base where less crowded. It seemed an attempt to revert to the usual number of parts in the lilaceous monocotyledones. Four specimens were found having six stamens and six perianth parts. Another flower showed five stamens and five perianth parts. And still another specimen was found having four stamens, but with six perianth segments.

The color of the flowers, according to one author, resembling decayed flesh, combined with the odor which is doubly suggestive, attract carrion-loving flies of the family Diptera, which are useful in the pollination of the closely crowded, otherwise inconspicuous blossoms.

Insect visitors.—From a recent article in *American Forestry* by R. W. Shufeldt, I find that a variety of bee introduced into this country from Europe is one of the earliest visitors, since they must have food early in the spring. The article further states that the honey bee, if able at all to enter, finds the exit too narrow and slippery and the bee perishes miserably. Another curious fact he has noted also is the frequent presence of spiders' webs at the entrance to the spathes. This fact was also noted by me. It is a case where the flower odor attracts the flies, and they in turn are entangled in the spider's web and so furnish food for the spider.

Shortly after pollination the spathe begins to decay and wither and the spadix to swell. It becomes soft and spongy and the individual fruits are covered with a papery skin-like sheath under which the seeds develop. These when mature are hard, round, dark brown and somewhat irregular in shape. In fact, they look a little like pebbles or stones. When fully ripe they break the sheath, fall to the ground and germinate the following spring, giving rise to new plants. A parent plant may be found having many seedlings coming up close around it.

In germination a small pointed, closely coiled shoot first appears above the ground. This is carefully wrapped in the thin papery sheathing leaves. When about a week old this shoot is about an inch in length. A few slender fibrous roots, rather long and thin grow downward into the ground. As yet there are not many roots to nourish the plant; these few primary roots have thread-like secondary roots.

By the second week, the seedling has grown much larger and the tip of the shoot has become freed from its papery sheath. This however grows along with the young plant. Also by this time a rootstock begins to develop. There are also many more roots, long, thin and tapering.

At the third week, the shoot has broken through both sheathing leaves and is quite large. At this time the seedling is about four inches tall. It has severed its connection with the remains of the seed by this time. From now on development consists of growing larger and larger rapidly. This plant however does not bloom the first year. Nor am I able to tell by actual observation, since my study has covered only a period of five months, how many years elapse before the plant has grown old enough to produce its first inflorescence. Probably the flowers are produced the fourth year.

That the plants develop more rapidly and better in warm, light places is seen by the table given by Dr. Mackenzie in her report before the Botanical Society in 1911. Also in some specimens which I brought in from the wood, the uncurled spire of leaves, just barely sticking above the soil, soon came into full leafage, in the warmth of the greenhouse. The plants had been

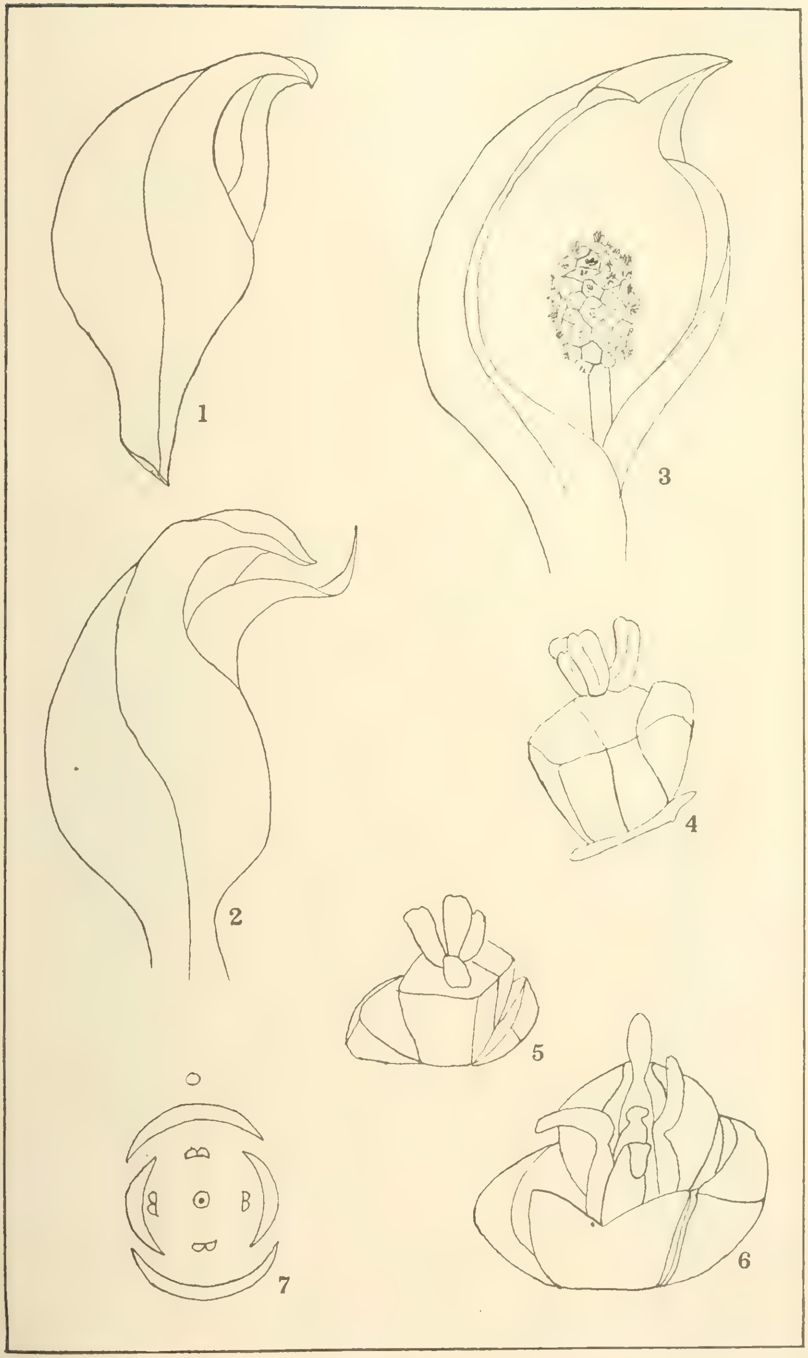
set aside in a bucket of water, as of little further use. In less than a week after bringing them in about six leaves were fully uncurled and widely spread.

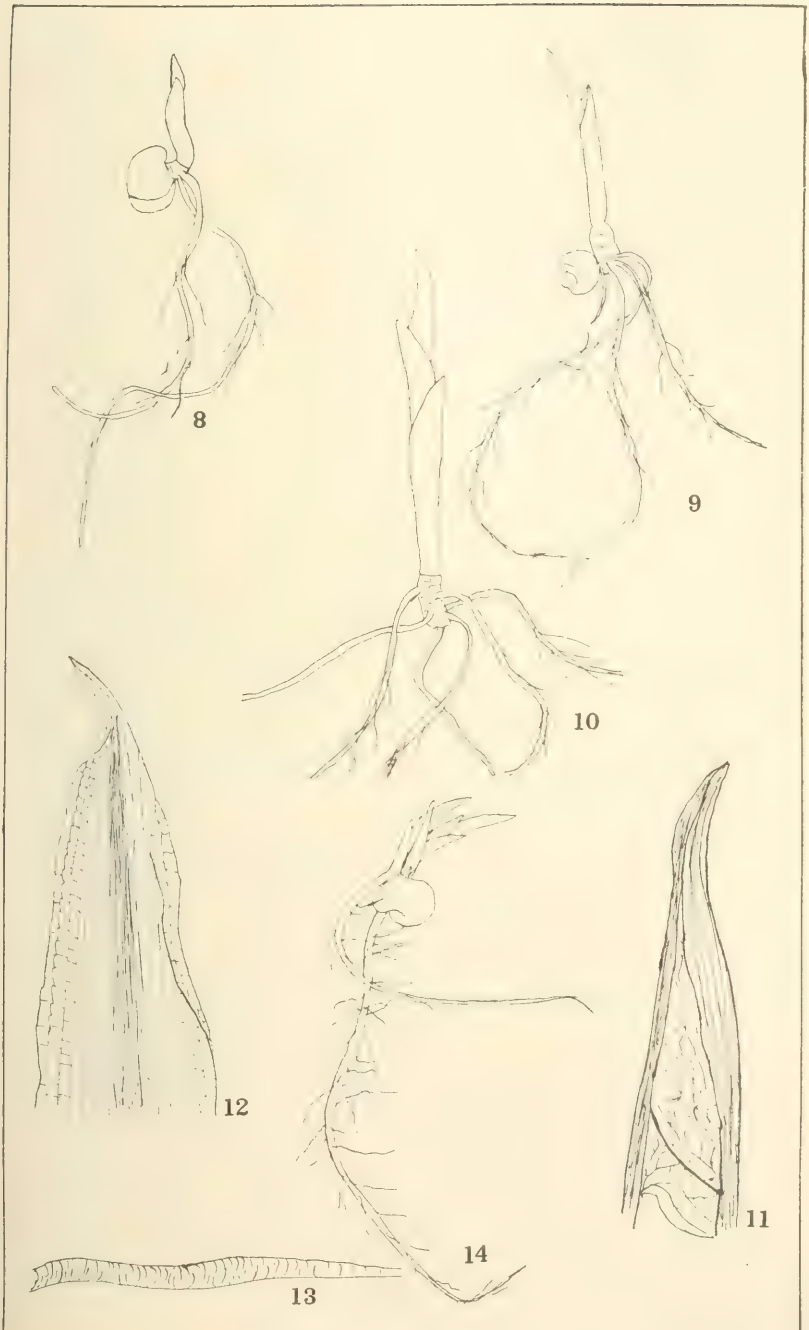
The leafage of the plant is quite interesting. Soon after the blossoms appear, a small whitish shoot is seen forcing its way above ground. On going one can see that it consists of two almost whitish sheathing leaves. These show the monocotyledonous character in having parallel veining. Closely rolled inside of these are the true leaves. They form a light hard-coiled center. The tips, when they have broken through the enveloping sheath-like leaves, are frequently colored purplish like the spathe of the plant. Such coloring may show on the outside of the tip of the first and even the second leaves. These inner, or true, leaves seem to break away from the monocotyledonous and tend toward the netted veining of dicotyledonous plants. The first three leaves unfolding show a gradual transition toward the netted veining of the later leaves. In all the cases the veining is palmately netted. Also in specimens planted under dry conditions, in a pot in a frame, and those under moist conditions, the plants grown under dry conditions tended to show the netted veining earlier than those of the moist environment.

The leaves when fully developed are quite large, being sometimes over a foot in length and at least eight or nine inches broad. They have an entire margin and are of a bright green color, rather shiny in appearance. They grow rankly in a rosette form, in the damp stream beds. Their great size makes them very conspicuous.

In a microscopical study the leaves show rather large air chambers and loosely packed cellular structures. Throughout the leaf are various rhaphides occurring in the large bundle masses. There are also several other types of crystals, a few cuboidal in shape, and even some spherical in shape may be found scattered loosely here and there—sphaerocrystals.

Juice.—The juice of the skunk cabbage is very bitter and acrid. This when tasted in the fresh plant had a peculiar garlic-like taste and seemed biting. By biting I mean the prickly sensation very much like that experienced on eating the root of

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the jack-in-the-pulpit. When the plant was cooked, the water was the color of weak tea and the plant itself lost most of its flavor and the property which gave it the biting character.

Roots.—The plant is a very difficult one to collect in its entirety, owing to its immense rootage. One must dig over a foot down into the soil before there is even the slightest sign of the roots giving way. There is a large central root-stock almost the size of a potato and from this great numbers of roots arise and grow downward for almost two feet in length. They are very long, rather straight and unbranched excepting for a few almost thread-like offshoots.

All the older roots are peculiar in having ring-like markings or wrinkles on them. These are especially seen near the upper or older end of the root. They are contractile roots and are peculiar to a few plants. Their general purpose is to pull the plant back into the ground as it grows up every year. By a process of contraction the roots wrinkle up and draw the plant down into the soil. The roots are permanently wrinkled after this contraction.

The root structure shows large loose cells and a single, radial central stele. The cells around the outer cortex, near the epidermis are particularly loose. This is due to the contraction of the epidermis.

Department of Botany,
University of Pennsylvania

Explanation of Plates

Fig. 1. Outside of Spathe of Skunk Cabbage.

Fig. 2. Double Spathe.

Fig. 3. Dissection of Spathe to show Spadix with Flowers. Spadix with extra long Peduncle.

Fig. 4. Single Flower of Skunk Cabbage.

Fig. 5. Flower with depression of two outer Perianth Segments.

Fig. 6. Flower laid open showing four Stamens and Pistil.

Fig. 7. Floral Diagram.

Figs. 8, 9, 10, 14. Early Stages in the Germination of the Seeds of the Skunk Cabbage.

Fig. 11. Closely rolled Leaves with Netted Veining.

Fig. 12. One of the first and outermost Leaves with Parallel Veining.

Fig. 13. A contractile Root.

SOME REMARKS UPON LIMOSELLA

By Francis W. Pennell

Professor Fernald's interesting discussion of our eastern coastal species of *Limosella* reached me as I was on the point of taking up the same problem. I had suspected, and had tentatively so marked it in my notes, that our eastern species would prove distinct from *L. tenuifolia* Wolf of Europe, and should be called *L. subulata* Ives. That it was specifically distinct from the plant of the Rocky Mountains I was certain, having studied and made descriptions of both in their native environments.

My notes, made from living plants and supplemented by herbarium study, show the following contrast between *Limosella aquatica* of the Central Rockies and nearby plains and *L. subulata* of the Atlantic seaboard:

L. aquatica.—Corolla about 2 mm. wide; lobes somewhat spreading, acute or acutish, dull-white. Anthers about 1 mm. long, purplish. Capsules 2.5 3.2 mm. long, borne on spreading pedicels. Seeds .5 mm. long, dull amber-brown, about 6–7 ridged, relatively coarsely transverse-lined. Calyx-lobes uniform. Leaves about 3 cm. long, consisting of a petiole and a more or less dilated lanceolate blade about 1 cm. long. Plant rosulate, 10-20 leaved, surrounded by numerous radiating few-jointed stolons.

L. subulata.—Corolla about 3 mm. wide; lobes widely spreading, obtuse, white, tinged with lavender-blue. Anthers about 2 mm. long, dark purple-blue. Capsules 2–2.3 mm. long, borne on arcuately decurved pedicels. Seeds .6–.7 mm. long, bright amber-brown, about 8–9 ridged, more finely transverse-lined. Calyx-lobes upcurved, in fruit the tube tending to split on the anterior side. Leaves 1.5–2 cm. long, nearly filiform, terete, obtuse. Plant chain-like, consisting of plantlets borne on joints of extensively creeping filiform stolons, each plantlet usually 5–10 leaved.

In agreement with Professor Fernald, I am unable to distinguish the plant of the Rockies from that of Eurasia. The western plant sometimes has pinkish corollas, but, so far as I can

find, variability of color between white and pink is characteristic of the European plant,* rather than a normal "pink or flesh-color." This species, *Limosella aquatica*, appears to be the most cosmopolitan member of the Scrophulariaceae, and its simple flower-structure and acaulescent habit mark it as primitive. It occurs to-day upon all the continents, and is even credited to New Zealand. Whether eventual knowledge will show that it has held conservatively true throughout its supposed range may be doubted, but certain it is that deviations are mostly slight and remote. However in widely scattered parts of the earth it has "thrown off" suggestively parallel species. Thus *Limosella subulata* may be closely duplicated in the Vancouver Island region, and in Argentina—but *a priori* assumption would be that these are not identical with it.

My field-acquaintance with *Limosella subulata* has been confined to one colony, but that fortunately extensive, growing about the margins of Old Sams Pond, Point Pleasant, New Jersey. This is a small pond of fresh water lying in the lea of the coast sand-dunes. The Garden herbarium shows a considerable series of specimens from sandy margins of such fresh sand-dune ponds, ranging from here northeastward to Nantucket.† These plants are partially, though inconstantly recognizable, from the species of muddy saline tidal habitats by their pedicels being more recurving, their capsules blacker; their sepals more

* The following quotations, chosen from various countries, confirm this: Baxter, Brit. Phan. Bot. pl. 212, "pale rose-colored or white," illustrated as white; Sowerby, Engl. Bot. **5**: pl. 357, "whitish without, red on the inside," illustrated as pink; Reichenbach, Ic. Fl. Germ. **20**: 54. pl. 1722, "corolla albida; maculae brunneae sub basi cujusvis laciniae corollae, suppositae intus saltem maculae citrinae," illustrated as described; Coste, Fl. France **3**: 27, "blanches ou rosees"; Murino, Fl. Galicia 100. "blanca"; Schinz & Keller, Fl. Schweiz 456. "weisse od. rotlichweisse"; Parlatore, Fl. Ital. **6**: 546, "bianchiccio."

† A letter from Mr. E. P. Bicknell, concerning *Limosella* on Nantucket, emphasizes its occurrence about the sandy margins of "closed," that is completely land-locked ponds. Some of these are freshwater, but one is mentioned as probably at least partly brackish. He calls attention to the fact that in ponds which stretch some miles inland from the shore *Limosella* will occur only at the shoreward extremities. Specimens sent from the deeper water of certain ponds much exceed in length of leaves the dimensions of the key above, and in coarseness of growth are like the tide-water plant. The halophytism of *Limosella subulata* would make a valuable physiological study.

frequently obtuse, and the leaves more slender. If these modifications be wholly ecological, are they mainly a response to a sandy instead of mud substratum, or to the lack of salt, or in good part to freedom from periodic inundation?

The range of *Limosella subulata* must be extended southward to Chesapeake Bay. *G. H. Shull 306* is from the "northeast shore of Gunpowder River, one third mile northeast of its mouth," Maryland, and certainly from between high and low tide. This collection and most of those from the tide-water of the Delaware River are of plants coarser, usually with longer and wider leaves, than the typical New England form. While the plant occurs on the Delaware between Philadelphia and Trenton, as near Burlington, New Jersey, this is much above the usual limit of salt water. As a general statement, we may say that *Limosella subulata* is primarily a plant of brackish soil, but that it is fully able to meet a dilute or even quite non-saline environment.

New York Botanical Garden

IN THE WAKE OF THE ENEMY!

This dirge for the orchards of France may be familiar to many of our readers, but losses described by the letter immediately following the verse, are just as indefensible. Can there still be found in this country people who, in spite of acts like these, cherish pre-war delusion about the "The Kindly German?"—Ed.

THE TREES OF FRANCE.

Hush, little leaves, your springtime dance,
Sigh for the murdered trees of France.

Friends were they of the peasant folk,
Friends whom the birds and kine bespoke.

Spoil are they of destroying lust,
Not of the battle stroke and thrust.

They are a garden still to see,
They are the world's Gethsemane.

Hush, little leaves, your springtime dance,
Sigh for the murdered trees of France.

—McLandburgh Wilson.

(The following extract from a letter of M. Jules Cardot, the noted French bryologist of Charleville, France, was recently transmitted to me through M. Thériot, of Havre. I am sure that friends of M. Cardot will be glad to learn tidings of him. —E. B. Chamberlain.)

"Depuis notre arrivée ici, je vis des jours qui compterons, certes, parmi les plus pénibles de ma vie, et si nous n'avions pas la victoire, qui nous console de tout, je me demande si je n'aurais pas été tenté d'en finir avec l'existance. Vous ne pouvez vous imaginer le spectacle que présente notre pauvre maison, l'état de saleté repoussante et de dévastation dans lequel elle se trouve. Partout des meubles brisés, les portraits de famille lacérés, des livres en lambeaux épars de la cave au grenier, les armoires, les secrétaires fracturés, quoique tous les clefs étaient sur les portes; tous les beaux meubles anciens disparus et remplacés par d'autres meubles qui ne nous appartiennent pas. Les livres qui n'ont pas été dechirés formaient dans le grenier une indescriptible salade; on se demande comment on peut arriver à mélanger ainsi une bibliothèque; ce doit être un travail très fatigant! A côté de cela des choses déconcertantes. Mes collections qui on avait dites évacuées sont là, en partie du moins. Je les a' retrouvées, entassées dans le fond du grenier et recouvertes par ma bibliothèque scientifique, qu'on a jetée pêle-mêle par dessus. Malheureusement mes pauvres collections sont loin d'être au complet. Il manque, outre tous les matériaux non étudiés, une énorme collection du Japon, de plus de 5,000 N°, contenant des centaines d'espèces nouvelles, une collection de Juan Fernandez, une autre des îles Sandevich et une autre encore de Saghaline, tout cela probablement détruit et perdu sans retour."

PROCEEDINGS OF THE CLUB

November 27, 1918

The meeting was held in the Morphological Laboratory of the New York Botanical Garden at 3:30 P.M., with Vice-President Barnhart in the chair. There were twelve persons present.

The minutes of October 30 and November 12 were read and approved.

The nomination and election of Bro. M. Victorin, Longueiul College, Quebec, Canada, followed.

The announced scientific program was then in order. Dr. P. A. Rydberg read a paper on "The Distribution of the Montane Plants of the Rocky Mountains." This paper will be published in the Bulletin of the Club.

Meeting adjourned.

B. O. DODGE,
Secretary

DECEMBER 10, 1918

The meeting was held at the American Museum of Natural History at 8:15 P.M. President Richards occupied the chair. There were twenty eight persons present. The minutes of November 27 were read and approved.

The nomination and election of Dr. George E. Nichols, Yale University, and President R. B. von Kleinsmid, University of Arizona, Tucson, followed. No other business was transacted.

The announced scientific program consisted of an illustrated lecture on "The Botanical Gardens at Buitenzorg, Java," by Dr. H. A. Gleason.

Adjournment followed.

B. O. DODGE,
Secretary

THE PLANTING OF TREES AS WAR MEMORIALS*

At the annual meeting of the Managers of the New York Botanical Garden on January 13, 1919, the following suggestions by Mr. Edward D. Adams were approved and ordered printed:

At this time, when permanent memorials to the defenders of our flag by land and sea are being considered throughout our land, and projects for community monuments of various designs are planned, we venture the suggestion that individual, as well as associated, action can effectively and economically be taken in

*Reprinted from the JOURNAL OF THE NEW YORK BOTANICAL GARDEN, **20**: 1–2, Jan., 1919.

honor of all who have served or of those who have made the supreme sacrifice, by planting memorial trees.

Such trees may properly be planted in the front yard, on the street, at the home entrance, in a park, as the decoration of an avenue, in single specimens or in groups of different species for artistic effects of form and color.

As representing sentiments to be long cherished, such memorials would be tenderly cultivated and protected.

Their shade and fruit would yield comfort and satisfaction. Their growth would add value to the home and become an asset that succeeding generations would inherit.

Naturally, only those trees should be selected for memorials to family, school, church, and municipal honor, that will grow best in each locality and of those species that will be appreciated for their beauty, grandeur, long life, and utility.

The number of kinds of trees suitable for memorial planting is large. The widely different climates of different parts of the United States require the selection of such kinds as will grow vigorously, and the character of the soil should also be taken into consideration; such information to those not versed in tree planting can usually be had from the nearest nurseryman or from officials of the Agricultural Experiment Station.

Those who live in homes without available grounds for planting, might contribute to the cost of a tree for its planting as part of a memorial grove in a park or garden.

The selection of the tree, the preparation of the location, and the design of the label or honor roll, may be considered and carried out in family conferences and with the participation of each member.

These preparations should be made as our men return, so that the signing of the treaty of peace may be celebrated over the nation wide by the simultaneous planting of the honor tree of each family and community that has cherished a service flag in the period of our war.

At the New York Botanical Garden, a war memorial plantation of Douglas Spruce, a characteristic American evergreen tree, will be established this spring; about one hundred trees

five feet high having been secured for this purpose. For those who do not have land available and who would like to have a memorial tree planted, the offer is made to designate one of these spruces as desired on receipt of ten dollars, which will cover cost of tree, of planting, and of its care, which will be the same as that of other trees in the Garden.

NEWS ITEMS

Professor Henry Allan Gleason, of the University of Michigan, recently spent two months in the study of North American Ironweeds, the genus *Veronia* and near allies at the New York Botanical Garden. Professor Gleason published some years ago a preliminary revision of *Vernonia* and he is now preparing the manuscript of the tribe *Vernonieae* for the *North American Flora*. Dr. Gleason spent a day at the Brooklyn Botanic Garden, where he revised the collection of *Vernonia* in the herbarium of that institution.

Mr. Charles Piper Smith, who has published several papers on *Lupinus* in the *Bulletin*, spent ten days recently in studying these plants at the herbarium of the Brooklyn Botanic Garden, and at the Gray Herbarium, Cambridge.

We learn from the Michigan Agricultural College *Record* of the death on December 6 of Miss Rose M. Taylor, instructor in botany at the College.

We learn from the *Evening Sun* that because of the similarity of climate and soil conditions of Texas and the land upon which the Jewish " Republic of Judea " will be built, the Zionist Society has retained Dr. J. J. Taubenhaus, plant pathologist of the Texas agricultural experiment station, for a high agricultural post in the new nation.

Much of the data compiled during his service here will be available for use in Palestine, Dr. Taubenhaus says.

TORREYA

Vol. 19 March, 1919 No. 3

THE JAPANESE HONEYSUCKLE IN THE EASTERN UNITED STATES.

By E. F. Andrews

The rapidity with which introduced weeds can multiply and take possession of new territory has been repeatedly demonstrated by such examples as the Russian thistle (*Salsola pestifer*), bitterweed (*Helenium tenuifolium*) and the Sida (*S. Spinosa* and *S. rhombifolia*)—plants which have become such common pests in certain parts of our country. As a general thing these unwelcome intruders belong to the class of herbaceous annuals and biennials, whose frequent succession of new generations, with the opportunities for seed production and distribution which this affords, makes them much more efficient travelers than the slower-growing woody shrubs and vines.

A notable exception to this rule, however, is furnished by the Japan honeysuckle (*Lonicera japonica*), an exotic from Asia, which I remember to have known in my youth only as a carefully cultivated and highly prized ornamental plant, twining about the piazzas of the old plantation mansions and covering the "summer houses"—pergolas, they would be called now—in old-fashioned southern gardens. The flowers are very fragrant and showy, and it was a profuse bloomer under cultivation, but since it has run wild and taken on the weedy habit, it has to a large extent given up flowering, and propagates chiefly by vegetative means. Wherever a shoot touches the ground it strikes root and then sends forth a numerous progeny of young shoots to repeat the process. The prostrate stems and those in contact with the soil, even on high banks and ledges, where there

[No. 2, Vol. 19 of Torreya, comprising pp. 21–36, was issued 19 March, 1919.]

is plenty of light, never, or very rarely produce flowers, but expend their surplus energy in adding to the network of tangled cords that covers the ground wherever this ruthless invader gets a foot hold. It will climb as high as heaven if it can find anything to lean on, converting the wooded areas in the moist river bottoms into an impenetrable jungle with its tangled cords of interlacing vines; or if forced to accept an humbler position, crawling with equal facility over the gullied slopes of arid hill-

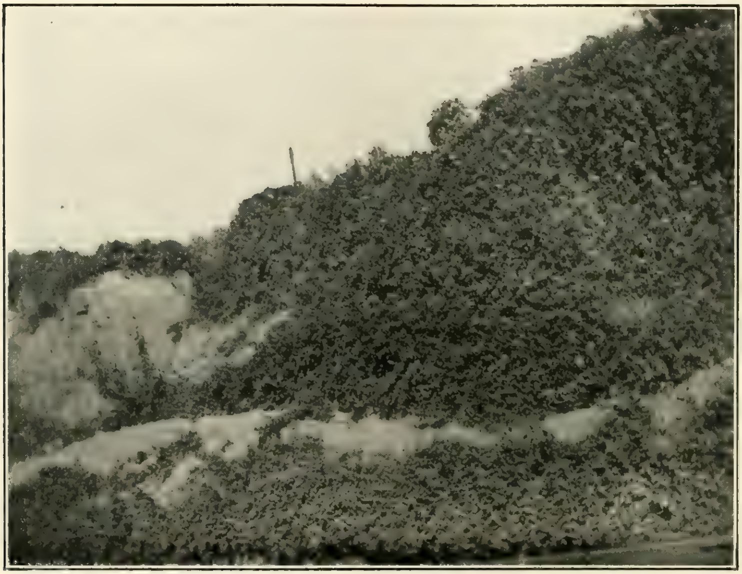

FIG. I.—Japanese honeysuckle covering the side of a railroad cut near Rome, Ga. The white patches in the foreground are not snow, but naked portions of the very sterile yellow clay soil.

sides or along the borders of dusty roads. This faculty might be turned to good account in stopping washes and covering unsightly clay banks, though its utility for such purposes seems never to have been tested. But while accommodating itself readily to almost any conditions, it shows a marked preference for moist woodlands and the borders of streams, and as its presence in such places does not interfere with the crops, or threaten any direct pecuniary loss, it has not attracted the attention of either the economist or the agriculturist.

But to the botanist engaged in any kind of field work this foreign immigrant is a most undesirable accession to our plant population. It infests his favorite hunting grounds and besets his steps with a tanglefoot of snares even more exasperating than the barbed wire fences, sometimes forcing him —and more especially *her*—to cut short such explorations. But the chief indictment against it is the ruthlessness with which it is overrunning and destroying our native plants wherever it comes in competition with them; and it is no uncommon thing to see acres upon acres of brushwood and haw thickets, sometimes including trees of considerable size, buried under the rank growth of this aggressive invader. As it has no way of climbing except by coiling around a support, which is a rather tedious process in the case of large stems; it can reach the crown of high-branching trees only by climbing upon the under brush of shrubs and young shoots until it comes in contact with some overhanging bough—and then it has a free right-of-way. It also utilizes the stems and branches of other climbers that have already made good their ascent—trumpet vine, catbriars, grape, Virginia creeper, and the like, not excepting those of its own kind. As the stems of both the twiner and its support grow larger, the tension often becomes so great that the coils are tightened like a noose, and become so deeply imbedded in the supporting stem as to give it the appearance of a huge corkscrew, and unless themselves broken or loosened by the strain, may cause the death of the parts above. More frequently however, it kills by smothering its victims under a dense network of interlacing cords, commonly from 3 to 6 mm. thick, loosely twisted together. I have counted as many as 27 strands of all sizes, from 1 to 10 mm. thick, twined into one of these living ropes. A single stem is rarely more than 1 or 2 cm. (about ¾ of an inch) thick, though in one instance I have seen a single honeysuckle vine 18 cm. (7 in.) in girth, smothering a wild plum tree (*P. nigra*) 1.5 dm. (6 in.) in diameter. It began by gripping a shoot from the base of the plum, in a spiral of 4 rings which have been drawn so tight by the continued growth of both stems that the honeysuckle, the more elastic of the two, has been flattened out like a piece of tape. As for the plum

shoot, it is now dead, and from the end of the stub the climber has reached out to the main stem and spread over the crown a network of luxuriant branches under which the tree is being slowly smothered to death.

This sort of piracy is no uncommon thing in the vegetable world, any more than in our own, but what surprised me in this case was the unusual size of the climbing stem. I took it for a grape vine at first, as the bark is fibrous like that of the grape, and it was not until I had plucked off leafy twigs actually growing out of it that I could feel sure they really belonged there and were not merely "hangers-on" of a hanger on. The bark is of a lighter color and softer texture than that of the grape, and also more easily detached.

On this lusty vine only one flowering sprig, with but two berries, was found. This was on November 7, 1917, and is the second specimen of fruit recorded in my notes for that year, though others may have been observed without being mentioned, and others still may have escaped notice on account of the difficulty of distinguishing them among the dark, evergreen foliage. But while all this may be so, I have kept up such a constant lookout for the fruiting sprays, and their scarcity is the subject of such frequent comment in my notes that although their presence may sometimes be overlooked, this is not a satisfactory explanation, and the fact remains that the production of fruit (and consequently of seed) is much less than would be expected of so prolific a stock. But while the flowers appear to be highly specialized for insect pollination, they seem, in the wild state, to have no set time for blooming. Even in spring it is unusual to see a honeysuckle vine loaded with flowers like the jessamines and clematis, but it continues to blossom sporadically throughout the greater part of the year (in this latitude, from April to December) producing a few sprays here and there—hardly more in May than in October. In this way, many of the late bloomers may "waste their sweetness on the desert air" so far as pollination and the perfecting of fruit is concerned.

But the most puzzling thing about this successful invader is how it has managed, with such imperfect provision for transpor-

tation over long distances, to spread over so vast a territory within the memory of persons still living. No mention is made of it in either "Chapman's Flora of the Southern States" (1884) or in the VIth edition of Gray's Manual (1889), and it was not until about this period that my own attention was aroused by the discovery that it was beginning to run wild in low, damp places around Macon, Ga. Since then it has spread over practically the whole of the Eastern States, from the Gulf of Mexico to the estuary of the Hudson, making itself equally at home in the low hammocks of the Coastal Plain, on the old red hills of the Piedmont region, on the stony ramparts of the Lookout Plateau, and onward for a thousand miles up the great Appalachian Valley. A writer from Texas in the American Botanist (Vol. 24, p. 5) mentions it as having "established itself in the brush around dwellings" in some parts of that State, and Dr. R. M. Harper also writes me that he has seen it growing along roadsides in Hingham, Mass.

The ease with which it propagates by runners will account for the rapid dispersal of the species locally, but for those distant migrations by which it has spread from Texas to New England and from the mountains to the sea, some more expeditious means of transportation is needed. The dissemination of seed through the agency of birds is the most natural means that suggests itself, and is probably the one employed, though the adaptation for this purpose is not very apparent. The berries, in addition to their infrequency, are "conspicuously" inconspicuous, being small, black, and sessile, or nearly so, in the axils of the dark green leaves, where it is difficult to see how they could attract attention even in a real "bird's-eye view." The small nutlets are embedded in a mucilaginous pulp like that of the mistletoe, but of a dark greenish color and an insipid, bittersweet taste, that would not seem likely to tempt a fastidious palate. It is not unlikely, however, that this pulp may play an important part in the distribution of seed, by sticking to the feet of birds and insects, and being carried about from place to place like the mistletoe. The plant is spread to some extent, even locally, by seed, and I have occasionally found a new colony forming in

places 200 meters (about 620 ft.) or more, from any others of the species which could have given rise to it. The seedling starts by sending out a number of prostrate branches which creep along on the ground sending out runners of their own in every direction until they find something to climb on, and in an incredibly short time will overrun everything that stands in their way.

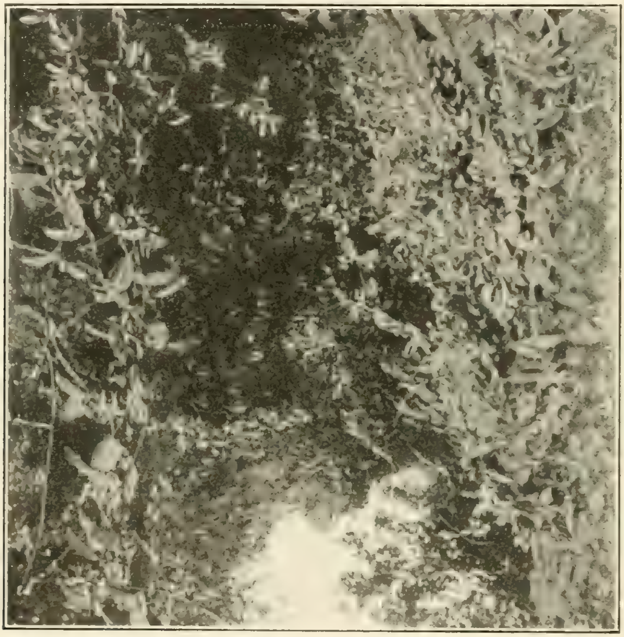

FIG. 2 —A honeysuckle jungle on the borders of a small stream in Wilkes County, Ga.

But after all has been said, the paucity of fruit in a plant so widely distributed has always been a puzzle to me, and as the flowers are dependent upon insect fertilization, I have sometimes wondered whether this might not be a case like that of the Smyrna figs, in which a particular insect partner was needed to insure pollination. The most reasonable explanation, however, seems to be that wherever the honeysuckle can propagate itself vegetatively, it employs that method in preference to wasting its energies in the more exhausting and expensive process of seed

production. In other words, nature, here, is economizing effort and following the line of least resistance. This accords with the fact that prostrate and low climbing branches do not bloom and that fruit and flowers are found only in positions where the opportunity for vegetative multiplication is restricted or wanting. In fact, the most remarkable crop of both fruit and flowers that I remember ever to have seen, was on a vine climbing over a wire fence between a cotton field and a potato patch, where the farmers were giving it such a hard fight that it had no chance to spread over the ground and was obliged to find some other outlet for its vital energy.

ROME, GEORGIA

VARIATIONS IN THE FLOWERS OF ERYTHRONIUM PROPULLANS GRAY

BY C. O. ROSENDAHL

Several species of the genus *Erythronium* are characterized by certain structural peculiarities of the flowers chief of which is the marked heteromorphism of the stamens. This has been demonstrated in two of our common eastern species, *E. albidum* and *E. americanum* by Meads* and Graff† and in a number of western and mid-western species by Pickett.‡ Among those studied by Pickett is *E. propullans*, a somewhat peculiar species which, so far as definitely known, is limited in its distribution to a small geographical area of southeastern Minnesota. In this restricted area it has been found only in a few places in the valleys of the Cannon and the Zumbro rivers, where it grows on wooded, alluvial bottomlands.

As a result of the very limited distribution of the species there are comparatively few specimens of *E. propullans* in the herbaria of the country and Pickett states that his observations on it were

* Meads, M. E. The Range of Variation in Species of *Erythronium*. Botanical Gazette **18**: 134–138. 1893.

† Graff, Paul W. The Stamens in *Erythronium Americanum*. Torreya **16**: 180–182. 1916.

‡ Pickett, F. L. The length of *Erythronium* Stamens. Torreya **17**: 58–60. 1917.

confined to only a few plants. He makes the suggestion that it would be desirable to examine more extensive collections to see if stamen dimorphism is characteristic of the species and accordingly the writer made it a point to look over the specimens of it in the herbarium of the University of Minnesota to see if additional proof could be obtained. The observations on the herbarium material were supplemented by a study of numerous specimens in the field in May, 1918.

These observations show beyond any doubt that the stamens of *Erythronium propullans*, like those of several other species of the genus, are characteristically heteromorphic. In fact there is perhaps an even greater proportional difference in the lengths of the two sets of stamens than is found in the other species, for in *E. propullans* the outer whorl of stamens reaches scarcely above the base of the anthers of the inner set. The accompanying stereoscopic photographs, which were made with a Zeiss stereoscopic camera with regular binocular objectives and with the flowers immersed in water, show this fact clearly. (The value of the figures is enhanced by examining them through an ordinary stereoscope.)

In the field material the average length of the outer stamens is 6.32 mm. while that of the inner is 7.99 mm., a difference of 1.67 mm. There is considerable variation in the size of the anthers ranging from 1.9 mm. to 3.5 mm. in length. The average length is about 2.46 mm. In some flowers the anthers of the outer stamens are regularly about .5 mm. shorter than those of the inner but this is not generally the rule and many cases were noted in which the anthers of the inner stamens were smaller in size than the outer. For the most part the anthers of one whorl of stamens differ as much from one another in size as they differ from those of the alternating whorl. This marked tendency to variation in the length of the anthers does not seem to affect the filaments for in all flowers examined the outer filaments were found to be constantly and uniformly shorter than the inner ones.

While examining the flowers for stamen heteromorphism another feature was brought to light which apparently has hitherto

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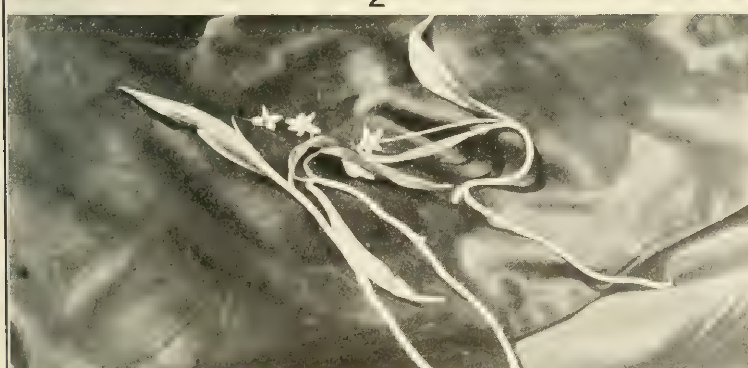

3

FIG. 1.—A flower of *Erythronium propullans* with four perianth segments and four stamens, showing the pronounced difference in the lengths of the two sets of stamens. Fig. 2. A flower with five perianth segments and five stamens, two of which are long and three short. Fig. 3. Three plants of *E. propullans* showing flowers with four, five and six perianth segments. On two of the plants the young offshoot can be distinctly seen.

been overlooked in *E. propullans*, namely a remarkable variability with regard to the number of the perianth segments, stamens and carpels.

Of a total number of 51 flowers examined in detail only six had six complete or normal perianth segments and only three of these had the full complement of stamens. Three flowers had five normal perianth segments and one of reduced size. There were eleven flowers with five perianth segments and twelve with five stamens. By far the largest number of flowers, namely thirty-one, had four perianth segments and there was a total of thirty-four which had only four stamens. One flower had three stamens and another one had only two. The following tabulation shows the variations in a more graphic way:

No. of perianth segments	6	5 + 1 abnormal	5	4	No. of stamens.	6	5	4	3	2
No. of flowers	6	3	11	31	.	3	12	34	1	1

It is thus obvious that only about 12 per cent. of the flowers possess the full number of perianth parts and only about 6 per cent. the full number of stamens. On the other hand about 61 per cent. of the flowers have only four perianth segments and fully 67 per cent. have only four stamens. About 21 per cent. of the flowers have five perianth parts and 23 per cent. have five stamens. Where there are only four perianth segments and four stamens each series is arranged in two alternating whorls of two each, the two shorter stamens occupying the outer whorl. In most cases where five perianth segments and five stamens are present the suppression has occurred in the inner whorl of the two respective series, thus leaving three short stamens and two long (Fig. 2). In at least one case the reverse condition with regard to the stamens was observed.

In the typically trimerous flowers the ovary is 3-celled but in the flowers having only four perianth parts and four stamens the pistil is reduced to two carpels and the ovary is 2-celled. In the flowers with five perianth parts and generally five stamens the pistil is usually made up of three carpels with three cells in the

ovary but sometimes one of the carpels is only partially developed, resulting in a somewhat irregular stigma and only two complete cells. In one case a flower with two separate pistils was observed. The pistil, however, shows the least variation in size of all the organs of the flower of *E. propullans*, the style being uniformly 5 mm. in length and the ovary about 3 mm. when the flowers are in anthesis.

So far as the writer is aware the flowers of *E. propullans* are considerably smaller than in any other species of the genus. They vary in length from 9 to 13 millimeters but the majority are a little over 10 mm. long. Attempts to ascribe to other factors than heredity the difference in the size of flowers of various related species of a genus are mostly futile, yet the hypothesis put forth by Blodgett* in explanation of the reduction in the size of the flowers of *E. propullans* seems to the present writer at least very plausible.

As is well known the offshoot in *E. propullans* pushes out from the stem near the middle (Fig. 3), its bud originating "at the base of the peduncle in the axil of one of the leaves." Thus the "vascular system of the peduncle supplies, through branches, the necessary strands for the offshoot." This side-tracking of a considerable amount of the food supply going up the peduncle may have had, in the opinion of Blodgett, "considerable influence in the reduction in size noticeable in the flowers of this form in contrast to the rest of the genus."

It seems very probable that the prevalent reduction in the number of the floral organs is due to the same cause and we have, at least in this species, a very simple physiological explanation for the fluctuations in the floral structures.

In conclusion it is worth noting that the genus *Erythronium* belongs to a subfamily of the Liliaceae in which the trimerous plan of the flower is quite consistently adhered to. The characteristic variations in the number of the perianth segments, stamens, and carpels and especially the preponderance of dimerous flowers in *E. propullans* are therefore very striking.

* Blodgett, F. H. The Stem Offshoot in *Erythronium propullans* Gray. Johns Hopkins University Circular, 3–5. June, 1909.

NEW NAMES FOR SPECIES OF PHANEROGAMS

By J. C. Arthur

While studying the Uredinales and listing their hosts for presentation in the North American Flora a number of phanerogamic species have been encountered, which have not been transferred, so far as the writer can ascertain, to the genera under which related species are being listed. As it is desirable to have these transfers made for the sake of uniformity, and as no one else seems desirous of making them at this time, they are here recorded. The advice of Mrs. Agnes Chase, Mr. Percy Wilson and Dr. F. W. Pennell has been followed, although the writer is to be held responsible for any errors that may occur.

Senites Hartwegi (Fourn.) nom. nov. (*Zeugites Hartwegi* Fourn. Mex. Pl. 121. 1886). A grass of Central America, and known from Mexico by the type specimen only, *Hartweg 569*. It bears *Uredo Zeugitis* Arth. & Holw. from San Rafael, Guatemala, 7000 feet alt. (Am. Jour. Bot. **5**: 538. 1918).

Sanguinale pruriens (Trin.) nom. nov. (*Panicum pruriens* Trin. Gram. Pan. 77. 1826). A grass of Hawaii, that has been referred to *Panicum sanguinale*. Professor A. S. Hitchcock holds it to be clearly distinct. He observed in the field that the racemes are erect, not spreading as in *P. sanguinale*, and Mrs. Chase has found that the first glume is wanting and the second very minute. It bears *Puccinia oahuensis* Ellis & Ev., which was only known from the type collection. obtained on the slopes of Makiki, Island of Oahu, by A. A. Heller, in 1895, until it was detected by Mrs. Chase on two collections of the grass made near Honolulu by Prof. Hitchcock, one along a ditch, June 16, 1916, no. *13735*, and the other as a weed in shady places, Halfway House, Mt. Tautalus, June 24, 1916, no. *13862*. *Puccinia oahuensis* is scarcely distinguishable morphologically from *P. substriata* Ellis & Barth.

Nymphoides Grayanam (Griseb.) nom. nov. (*Limnanthemum Grayanum* Griseb. Cat. Pl. Cub. 181. 1866). A West Indian aquatic plant in the family Menyanthaceae, on which aecia of *Puccinia Scirpi* DC. were found in Cuba by Charles Wright in

1858. It still remains the only rust collection on this genus of hosts known for America.

Aureolaria virginica (L.) nom. nov. (*Rhinanthus virginicus* L. Sp. Plant. 603. 1753; *Dasystoma virginica* Britton, Mem. Torrey Club **5**: 295. 1894). A common Scrophulariaceous plant of the northeastern United States, which bears aecia of *Puccinia Andropogonis* Schw.

Dasystephana spathacea (H.B.K.) nom. nov. (*Gentiana spathacea* H.B.K. Nov. Gen. Sp. Plant. 3: 173. 1818). A Mexican species, which bears the widely distributed rust *Puccinia Gentianae* Link.

Dasystephana Menzesii (Griseb.) nom. nov. (*Gentiana Menzesii* Griseb. Gen. Sp. Gent. 292. 1839). A Californian species, which bears the rust *Puccinia Gentianae* Link.

Purdue University,
Lafayette, Ind.

BRYOLOGICAL NOTES

V. *Scapania nimbosa* from Norway

By A. LeRoy Andrews

Of the remarkable "Atlantic species" of the northwestern European coasts washed by the Gulf Stream, obviously relicts of an older flora, two Scapanias stand out sharply from their congeners. The one of wider distribution, commonly known as *Scapania planifolia* (Hook.) Dum., should according to Pearson bear the earlier specific name *S. ornithopodioides* (Dill.) Pears. It is known from various stations on the west coasts of the British Islands, from the Faroes and a few localities on the west coast of Norway. According to Müller* it is certainly identical with species known from isolated stations in Hawaii and the Himalayan region of India.† *S. nimbosa* Tayl. was hitherto known only from relatively few places on the western coasts of the British Islands.

* Rabenhorst, Kryptogamenflora, VI, 521. 1915. The author's earlier (1905) monograph of *Scapania* is not at present accessible to me.

† This conclusion is also accepted by Stephani, Spceies Hepaticarum, IV, 136f. 1910.

In the summer of 1907 the Norwegian bryologist, Herr B. Kaalaas, kindly permitted me to accompany him on a collecting trip on the western Norwegian coast in Romsdals Amt. His main purpose was to establish more definitely the northern limit of the Norwegian range of the "Atlantic species," many of which he had himself been the first to find in that country. While I was with him we found one new station for *S. planifolia*, by the lake Gusdalsvand in Vanelven, a point which we reached from temporary headquarters at Aaeim. Our most northerly operations, and the last before I was obliged to leave, began with a trip by water from Molde to the small fishing village on the low cape Bud. From there we walked to the little settlement of Farstad, as I remember, where we succeeded in finding quarters. It was Herr Kaalaas' idea to investigate from here particularly the high promontory of Stemshesten. We learned, however, of an area of limestone to the southward in the Tverfjeldene* and decided to divide our forces for the one day we had available, Herr Kaalaas investigating Stemshesten, while I tried to reach the marble of the Tverfjeldene. With the time consumed in going and coming, together with a certain amount of climbing, I was not able to make a thorough survey of the place, but did find a number of interesting bryophytes. Among them was a *Scapania* which I took from its general appearance to be *S. planifolia*, and it was so recorded by Kaalaas as the most northerly station for this species.† Müller‡ also records this as the northern limit of the species. On more careful examination my specimen proves, however, to be *S. nimbosa*. The descriptions of Macvicar§ with figures show two quite distinct species, and I have also been able to compare authentic material of both distributed by the English hepaticologist, W. H. Pearson, so that there is no question as to the identity of the plant. The record

* The gneiss of western Norway is varied by occasional outcrops of limestone (marble), which are in some cases large enough to support a distinctive calcicolous flora. We had previously driven from Molde to such a locality north of there containing a cave (Troldkirken), from which the Tverfjeldene are not far distant.

† Lat. 62° 56′ N. Untersuchungen über die Bryophyten in Romsdals Amt, 26. 1911.

‡ Loc. cit.

§ Handbook of British Hepatics, 368f. 1912.

represents a considerable extension of the limited range of *S. nimbosa*, which had been known only from the British Islands, and at the same time adds one to the list of "Atlantic species" known from Norway.

ITHACA, N. Y.

NOTES AND NEWS

Dr. W. A. Cannon, of the staff of the Department of Botanical Research of the Carnegie Institution, reached San Francisco in the last week of April after an extended trip to Australia for the prosecution of his work on the root systems of desert plants.

A specimen of *Panicum urvilleanum* Kunth in the National Herbarium collected by W. L. Jepson (no. 6049) near Edom in the Colorado Desert, southern California, shows several spikelets bearing two sterile florets below the well-developed fertile floret. The florets resemble each other as to pubescence. The upper of the two is slightly longer and less pointed than the lower and has a well-developed palea. In the lower no palea has been observed, the lemma only being present. Sixteen other specimens from North and South America in the National Herbarium have been examined but in all the spikelets appear to be normal. So far as known this is the only species of *Panicum* showing a departure from the single sterile (or staminate) floret, characteristic of the tribe Paniceae. In *Lasiacis anomala* of the same tribe recently described* the spikelets normally bear two sterile florets, this being the first case known of the presence of a second sterile floret in any member of the Paniceae. In *Panicum amalurum* Hitchc. & Chase and in species of *Ichnanthus* the glumes are sometimes multiplied but in these there is no fertile floret, a terminal staminate floret only being present.—KATHARINE D. KIMBALL, Bureau of Plant Industry, U. S. Dept. Agric.

The New York Botanical Garden is at present engaged in the preparation of a descriptive guide to the collections in the economic museum. In the course of its preparation, we have found so many omissions of common and important articles that we are

* See Hitchcock, Journ. Washington Acad. Sci. 9: 35. 1919.

making a special effort to complete the list before printing the Guide. It would be a great favor if readers of TORREYA would either collect for us such of our desiderata as may occur in their respective localities or notify us where they can be obtained.

The following are desired for preservation in the fresh state in a mixture of one part of formalin to sixteen of water. They may either be placed in the solution at once, in ordinary fruit jars with the tops securely screwed down, and suitably labeled with name, locality, date and name of collector, or they may be sent to us wrapped in paraffin paper, provided they can arrive in a fresh condition.

Wild leek (*Allium tricoccum*) plants bearing their bulbs.

All wild gooseberries.

Wild red currant.

The sand blackberry.

Vanilla grass (*Savastana odorata*).

Sorghum cane, sugar and molasses.

All huckleberries and blue berries of the south and southeastern states.

Mitchella repens in fruit.

Chiogenes in fruit.

Wild cranberry in fruit.

Batodendron arboreum in fruit.

Ripe olives on the branch.

Yucca baccata fruit.

Chinquapin twigs with ripe burs.

Wintergreen berries on the stem.

Orontium aquaticum, fruiting tops.

The following may be sent in in the natural condition as collected:

Rhizome of *Dryopteris marginalis*.

Roots of *Asclepias tuberosa*.

Roots of the wild chicory plant.

Cultivated plants of the large horse sorrel (*Rumex acetosa*).

Bulbs of *Calochortus*, any species.

Yucca baccata roots.

Eurotia lanata, dried and bundled.

Atriplex patula, dried and bundled.

Tubers of *Psoralea esculenta* on the plant.

Tubers of *Solanum Fendleri* on the plant.

Tubers of *Solanum Jamesii* on the plant.

Tubers of *Hoffmanseggia* on the plant.

Grain of wild rice in the hull.

The same, cleaned.

Chufas, about two pounds.

Each specimen will be placed in the cases prominently labeled with the name of the donor and the same acknowledgment will be made in the printed Guide Book.—H. H. Rusby, *Hon. Curator*

Dr. Henry Allen Gleason has been appointed the First Assistant of the Director of the New York Botanical Garden, succeeding Dr. W. A. Murrill, who has been transferred to the new position of Supervisor of Public Instruction.

Camillo Schneider, whose botanical explorations in China were cut short by the war, and who has been studying *Salix* at the Arnold Arboretum, recently visited the Field Museum at Chicago, the New York Botanical Garden, the Brooklyn Botanic Garden and other institutions. Mr. Schneider has been working on the native American willows, of which he reports the number of probable wild hybrids to be very great.

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TORREYA

Vol. 19 — April, 1919 — No. 4

BOTANY IN THE CITY HIGH SCHOOLS*

By Francis T. Hughes

Just at present high school biology in general and high school botany in particular are in a very critical position. The cause I believe is both external and internal, but largely external. Prejudice, the child of ignorance, jealousy, and even patriotism, strange as it may seem, are among the forces that are working against us from the outside. While from the inside our failure to recognize the changed conditions existing in our high schools, due to a certain complacency and false sense of security in the standing and permanency of our subject, has left us in a precarious situation.

To be more specific: I shall try briefly to outline what I consider the external situation and the internal conditions that I have just enumerated, and to point out, if I may, a few remedies that may relieve the situation and bring botany back into its own in the New York City high schools.

First as to prejudice and ignorance, which are practically the same thing. I heard an eminent physician say the other evening that the layman's knowledge of medicine was always one generation behind that of the specialists. And so in high school botany we are accused by people who really ought to know better, of teaching a kind of botany that was in vogue twenty years ago, and which we never think of teaching now. Their idea of botany is what they themselves studied years ago. It consisted of memorizing long scientific names, learning endless, minute classifications, and incidentally plucking a few flowers.

* This and the next two papers were delivered at a meeting of the Club on March 11 devoted to a conference on Botanical Education in the Secondary Schools.—Ed.

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Next as to jealousy, or rather let me call it competition among the various high school subjects for a permanent place in the curriculum. In the New York City high schools we have had until recently three sciences in our course of study—biology in the first year, chemistry or physics in the second and physics or chemistry in the third, with sometimes an elective in the fourth year. Suddenly, however, from out of the west came a gay young Lochinvar, known as general science and then things began to happen. I shall not attempt to enter into a detailed discussion of general science here this evening. That is a topic calling for a special meeting by itself. Suffice it to say that our friends the physicists and chemists, especially the physicists, at once seized upon it as the solution of many of their problems, and in their magnanimous and altruistic spirit worked for its introduction into first-year high school in place of biology. For years the physics and chemistry people have been worried over the immaturity of their pupils and the time it took them to learn elementary physical and chemical principles. They could do none of their cherished advanced work and they certainly were in a quandary. Therefore, when general science appeared over the horizon they seized upon it with avidity as a preparation and a preliminary subject for their own courses. Here, said they, is just the thing to give the first-year pupil the proper apperceptive mass of physical facts and principles upon which we can later construct our real physics and chemistry. Here is our looked-for opportunity. Did they ever consider what this would do to biology? I don't believe they ever deemed it worth thinking about. What I have just said about general science and the physical science folk may seem a trifle exaggerated. If, however, you wish to substantiate it, just look over the general science text-books that are being published and see the relative amount of space devoted to physics, chemistry and biology, or examine the topics taken up in the high schools where general science is now being taught. In one high school in Brooklyn first-year general science is actually being taught by physics and chemistry teachers. That, I think, should show which way the wind is blowing.

Finally, in what way does patriotism affect us? As you all know there has been more or less Bolshevism in the schools, especially in the high schools. The authorities have been at their wits ends to stamp it out and they are going to try the following remedy: They are going to try to conquer Bolshevism by teaching concrete practical American patriotism. They are going to try to show our high school pupils that their political and economic salvation lies in upholding the principles upon which this government is founded. To this no patriotic American would think of objecting or even disagreeing. But what is the specific program to be followed? In the first place economics is to be put into the last year of high school and no student may graduate without passing it. An excellent and patriotic idea, we all agree. Secondly community civics is to be taught in either the first or second year of high school with a minimum requirement of two periods per week for a year, and this is where we are directly affected. Several high schools are giving all of the community civics for four or five periods per week in the first term or first year, and biology is being forced out to make room for it. Now what we biologists contend is, that while community civics should be taught to our pupils, the place for it is in the elementary or junior high schools and not in the regular high schools. I am saying this not simply because I am a biologist, but because I firmly believe that no other subject in the curriculum has those qualities which adapt it so peculiarly to first year high school students as does elementary biology.

I seem to be digressing somewhat from my topic, but I feel that the situation is serious enough to warrant it; and unless we are prepared to meet it, and, meet it right now it will not be at all necessary to consider the kind of botany that is best for our city high schools.

But to get back to my subject. What kind of botany should we teach in New York City high schools? In the first place we should begin with the pupil's environment, the environment of his home, if possible, or the environment of his school or of the neighborhood of his home or school. This, it seems to me, is a fundamental principle, a sort of pedagogical commonplace, but

some teachers seem to consider it practically impossible. In its place they try to construct a course or series of topics which, though vital and necessary in the eyes of the teacher, either have to be forced upon their pupils or given to them camouflaged with all sorts of more or less interesting appendages. And what is the result? The pupils dislike it; they get very little good from the work; the subject becomes unpopular, and finally it has to fight for its very existence. And the whole trouble has been started by its friends.

In most of our high schools where a regular course in botany is given, we find the following methods in vogue: Some try to follow the order of nature. They start with seeds and seedlings and working their way through roots, stems, leaves, flowers, fruit, wind up with a little on forestry. In other schools the start is with made soil composition and chemistry. In others the parts of the plant receive only enough attention to furnish the structural basis for teaching the vital processes. In other schools little or no time is spent upon botany as such; but most of it is occupied with foods and nutrition, bacteria, sanitation and kindred subjects.

In contrast with the above my idea would be to include most of the foregoing topics, but to utilize them by linking them up with the most accessible and obvious botanical object the pupils meet with in their daily lives. Let that object be a tree or shrub or even a potted plant in the class room; but by all means let it be some tangible concrete object, some plant whole, something that they can see, something that they can examine and something that they can watch grow. Let them give it a name, its correct botanical name. There is nothing like a name to give a thing individuality. Let them consider it a member of a class, —a non-resident member if need be—but a member just the same.

If the pupils are fortunate enough to be raising a war garden, then let that be the center or nucleus upon which their botanical work is based. Children of the first-year high school age are very practical and matter-of-fact in many ways, and while it is sometimes a hard job to get them interested in plants in general,

it is the easiest thing in the world to get them interested in some one particular plant. It is like their instinct for keeping pets. The average boy is not so much interested in dogs in general,—in the way a grown-up lover of animals is apt to be. What he cares particularly about is his dog Jack and in his mind all the other dogs in the neighborhood are just plain dogs.

If the object selected for study be some particular tree or shrub, the next thing to do would be to get a picture of it and hang it up in the classroom. If one of my pupils had a camera I would have him take a photograph of it, or in lieu of that I would have one of the pupils make a large drawing of it. At any rate if I could not get the plant into the classroom, I would have its picture there.

Some may raise the objection: What concrete botanical object can be found in the environment of a lower East Side high school boy? What trees, for example? Let us see. A great many of such boys go to either DeWitt Clinton or Commerce or Stuyvesant. None of them have trees or shrubs about their homes and so far as I can recall there are none either near or on their school grounds? But do you realize that DeWitt Clinton, situated as it is in one of the most congested and botanically undesirable sections of the city, is only two blocks from Central Park and many of the boys pass the park on their way home. Commerce also is but a short distance from the park. Every other high school that I can think of either has trees around it or has one or more small parks in its neighborhood. If the high school is in the suburbs or outskirts I would select a tree or shrub from in front of a pupil's home.

But why begin with a tree? For one reason because it is large. There is something about size or bigness that seems to appeal to the average high school pupil. It is his idea of greatness or value. Did you ever notice the smile or look of contempt that comes over a boy's face the first time you hand him a bean to examine? To him a bean is something to eat or to play with, but not to study. It may be all right for elementary school pupils to raise seeds in a cigar box, but not for him.

Another reason for selecting the tree is that it is likewise the

botanical object most familiar to the pupil's parents and therefore the most likely to maintain their respect. On the other hand a seed suggests the farm and the average city parent, thinks, if he thinks about it at all, that farm topics do not belong in a city high school. I may seem to be emphasizing too much the parent's opinion of things, but the strongest ally of any subject is the sympathy and coöperation of the parents. I am not saying this in a spirit of opportunism. But if we believe our subject is worth while and good for the pupils we should do everything possible to disarm criticism from the home and by a judicious amount of tact and resourcefulness lead both parents and school officials around to our way of thinking. There is an old saying and a true one: "You cannot catch flies with vinegar." So do not begin your subject with an altogether strange or uninteresting topic.

In connection with this let me repeat a story I heard a short time ago about a parent's objection to botany. This parent had a daughter studying botany in one of our suburban high schools. One day he asked her the name of the tree in front of his house. The girl did not happen to know the name and the father began to wonder what kind of botany his daughter was studying. Thereupon he called upon his daughter's teacher and politely told him that botany should be thrown out of the schools and something more useful put in its place, since his daughter could not tell one tree from another. In answer to this complaint the teacher said: "My dear Sir, naming and identifying trees is but a small and insignificant part of botany. What we teach is the more fundamental life processes; then later on if we have the time we take up classification." Was that teacher right? Substantially and in the matter of content, yes. But in the manner of approaching his subject or parent as the case may be, I think that he was wrong. The parent's criticism may have been captious and insincere, but he had some grounds for it just the same.

Now as to the way in which we should go about the detailed treatment of the tree or shrub. If I began with the fall term I would start with the leaves and their structure. After that I

would take up respiration, transpiration, photosynthesis, etc. But how would I get enough leaves from a city tree to supply all of my classes, especially when there is a park ordinance against picking leaves? I would not try to get them from the city tree. I would get them in the country during vacation time or on Saturday or Sunday. That, I do not think, is too much to do for one's subject.

How are we to teach the vital processes? Are we to rig up a set of apparatus on one of the park trees for the wonder and admiration of the passing throng? Not at all. I would demonstrate the different functions in the classroom with the same materials and apparatus that I always use, but I would refer everything to our chief object of study and constantly remind the class that they were observing not only what trees in general are doing, but also what one tree in particular was doing in order to keep itself alive.

What about the flowers and fruit of a city tree? That seems an almost unsurmountable obstacle but it is not. Its very difficulty gives zest to its solution. If the average city person knew that oaks and elms had flowers and fruit he would pay little attention to it. But the element of surprise that strikes him upon first being made aware of the fact first excites curiosity, then arouses interest and finally holds his attention. It is not the entirely new that arrests our attention, nor the completely familiar; it is rather the one in connection with the other. It is the old in the midst of the new, as when a traveler hears his own language in a foreign country—or the novel in the midst of the customary—as when we hear a strange tongue spoken in our own country—that attracts attention.

But to get back to the flowers: I would not attempt to teach them at all directly. I would have a chart or drawing of the flowers of that particular tree or shrub. But I would give a complete set of lessons on the most available flower, I could get at that time of the year, but as with the leaves I would constantly refer them to our main object, the tree.

The fruit I would treat in the same way, using the tree's own fruit if available; if not, then some common fruit in its stead.

The next topic is the stem. To teach this we should have cross and longitudinal sections of the same kind of wood. Branches of almost any kind can be secured from the Park Department; their wagons will deliver them to the schools and the boys will be only too glad to saw them up into sections and even varnish them for you. This I have had done several times. All that it requires is a letter to the Park Superintendent. As for the other parts of the tree I would not spend much time on them, but I would put most of the emphasis on the leaves, flowers and fruit; and would treat the rest only enough (in a general city course) to show their functions and their relations to the food making and reproductive organs.

Having thus taken some common shrub or tree as our type form and taught the structure, functions and adaptations of the principal parts, I would then take up any other botanical topic best adapted to the needs and environment of my pupils. With one set of pupils I should emphasize the economic importance of plant products and by-products as food; with another group, especially where there was a manual training department I would spend much time on woods, their kinds, uses, etc.; and so on selecting my topics according to the needs of the various classes.

My idea in advocating the study of some one particular plant as outlined above is this: Heretofore we have been studying seeds with the bean and corn as types, roots with the carrot and parsnip as types, and stems with the oak sections and horse-chestnut twigs, but somehow or other the pupils never linked them together. To them the bean did one thing, the carrot another, the horsechestnut twig a third and so on. They did not connect them all with the plant as a whole. On the other hand I think, that if we take one complete object, treat it as a whole and in detail, we will secure greater concentration and develop more fully the fundamental mental processes of analysis and synthesis. We can show the relation of the whole to its parts and the parts to the whole.

Paralleling all of this work and in close connection with it, as one of its most valuable features, I would use to the very fullest

extent possible our botanic gardens and museums. I would not look upon them as a mere adjunct to our work or as factors in a method of teaching, but I would connect them as an integral part of the subject and in one sense the most important part. If the training and botanical knowledge that we give to our pupils is going to amount to anything it must not stop at the end of the first year course in elementary botany. How then are we going to continue it, especially with those pupils who cannot go to college? The answer is, teach them how to use the gardens and the parks. Teach them so that in later years and even during the rest of their high school course, they may find in them a place for recreation and a source of inspiration, a means of avocation, and in some cases, let us hope, a field for serious study. What the public libraries are to the English and history departments, the gardens, parks and museums should be to the biology department.

In conclusion let me say that though the present outlook is none too bright, and we may have to fight for the very existence of our subject, the future is not hopeless. If we believe in our subject let us vitalize it. Let it meet the needs, solve the problems and arouse the interests of our pupils. If we do this, if we vitalize it properly, botany will compel its own recognition.

Boys High School,
Brooklyn, N. Y.

CHANGES IN TEACHING BIOLOGY IN OUR HIGH SCHOOLS

By Cyrus A. King

To graduate from a city high school, a pupil is required to pass and receive credit for 17 units of work. Of these units, eight are required of all pupils. Three are in English, three in history and civics and two are given for work in drawing and physical training. The other nine units are selected from the following groups: Three from a foreign language group, two from another language group, two from the mathematics or science group, and the remaining two from any group.

This seems an admirable arrangement, and at first glance, one might think it offered a wide range of selection to suit the individual wishes of different students. However, when we consider the traditions of the high schools, and the still more rigid traditions of our eastern colleges, we find that the sciences are *practically* cut off from our best class of pupils, the ones who intend to go to our higher institutions, and who, in consequence, are ultimately to be our most influential citizens.

I propose to illustrate this by selecting three typical examples. Let us suppose that a boy wishes to prepare for an engineering school. In addition to his eight credits, which are required, he selects a language and carries it three years; this leaves *six* units. Our best engineering schools require four years of preparatory work in mathematics; this leaves *two* units. These are usually taken in physics and chemistry because they are often required. This boy has no chance to select the biological sciences, unless he takes them as extra subjects.

Let us now take the case of a girl who wishes to enter one of the better girls' colleges, for example, Mt. Holyoke, Smith, Vassar or Wellesley. In addition to the eight required units, she must have *four* units in Latin, at least *two* in a second language, and *two and a half* in mathematics. This leaves one half point for science work.

For the third illustration, we will select a pupil who does not intend to go to college. The traditions of most of the academic schools will cause him to elect a modern language, which he will carry for three years; he will also take at least two years of mathematics; this leaves four units to be selected from a second language, from courses in stenography and typewriting, and from the different sciences. Let us suppose that he selects two sciences the question is shall one of them be a general course or a course in biology.

The biology courses that are now offered in our city high schools are, relatively speaking, new. They have no inheritance and no traditions. Unlike Greek, Latin and mathematics, they have not occupied for centuries an important place in our educational institutions. They are so new that we have scarcely

had time to stabilize them. However, there has never been such an age as the present. Days count almost as years of certain earlier periods. Under such conditions, a modern subject is rapidly adapted to our educational needs. Furthermore, biology certainly has the merit of having had no opportunity to become fossilized.

Our elementary course in biology was born about 1900, was revised thoroughly in 1905, again in 1910, and a new revision has just come from the press. The advanced course in biology was approved three or four years ago. It is now undergoing a revision.

During this interval of twenty years, the aims of the course have broadened and the work became more definite. And now at the end of this time, when we have the best courses that we have ever had, when we have a corps of highly trained efficient teachers, and know that ours is one of the most valuable subjects in the whole curiculum, it is actually being forced out of the schools for a conglomeration of every thing in kingdom come which for lack of a better name is called general science. The New York City schools are now teaching general science without a syllabus and without specially trained teachers.

I have looked over about a dozen text-books in general science, some good, some fair, and some poor, and have the honest conviction that the subject, at the present time, is not well organized.

True to their name, our biology courses center about life and living things. *Their aim is to teach the fundamental principles of life and it is impossible to develop these principles in the limited time given to the subject in a general science course.* To accomplish this it is necessary to study a number of forms that are widely different. This is why we have put into our courses a considerable amount of plant study, a somewhat less amount of animal study, and, finally, a study of man with an application of these principles to him. We believe that a pupil who has proved that respiration takes place in germinating seeds, that it takes place in higher plants, that it is necessary in the life of the paramecium, who understands how the insects, the fish and the frog are adapted for breathing, and who knows something of the organs

of respiration in man and their adaptations, sees a deeper meaning in respiration as a vital process. The same thing applies to the great facts of sex reproduction, inheritance, and eugenics. Our course requires that we work with living things that throw light on the fundamental problems of life.

At the risk of being called old fashioned, I do not hesitate to say that the foregoing kind of work is the most important that can be offered in any course in biology. And what are the reasons for not having such a course in every high school? What kind of an education is it that fails to recognize the value of the study of man as a living organism. Mentally and physically, he is the center of all education and he is unified with and bound to these lower organisms by the laws of life. Furthermore, if an additional argument were needed, we know that the study of plants and animals trains him in observation, develops his judgment, give him the method to reason logically, and finally furnishes him with important information about himself. It also opens up a new living world that he will appreciate all his life.

Recently a father, who by the way is a strong advocate of general science, said to me: "Your biology work is not making good." I asked him why he thought so and he said that his daughter had taken the course for a year and did not know the names of the trees on the block where they live. This, in his opinion was a serious criticism. My answer to this is that our course requires that we place the emphasis chiefly on important biological problems and that this leaves little time for such superficial work as learning names, even though this is desirable. However, before passing in the course, that daughter had to know the general structure of a root, the way it gets water from the soil, and she had seen this illustrated in the laboratory. She had to know the course of the water through the root, stem, and leaves; and she had seen experimental proof of this. She learned by experiment how plants give off water and something of how food is manufactured. She knew, too, that this tree took in and gave off certain gases and the reason for this exchange. This incident illustrates the type of criticism that we are receiving. In the main, it comes from persons who have no con-

ception of the value of our work, who are more or less antagonistic to it, or who have their ears on the ground listening for something new.

A second aim of the course, is to emphasize the relation of biology to human welfare. This brings out the commercial importance of plants and animals and our dependence upon them; especially upon plants. It is a revelation to our city boys and girls to find that the *annual* value of our *corn* crop is greater than any *liberty loan except the fourth*, and to learn that our wheat and oats crop in 1917 were about two billion dollars *each*. Only after they realize the tremendous importance of our crops, do they appreciate the damage done by plant diseases and insect pests. One writer, for example, estimates that the hessian fly and the wheat rust *each* destroy one tenth of the crop. While this may be an exaggeration, it nevertheless suggests the importance of biology to our daily life. It is an introduction to the study of agriculture in its various phases, to pharmacy, to dentistry, and to medicine, and it also interests them in the laws of inheritance and in plant and animal breeding.

The study of bacteria gives a second important relation to human welfare. The names and structure of bacteria are of little importance to our pupils. But it is important that they know the conditions under which bacteria thrive well and the conditions that cause their death. Pupils should know how abundant they are, and the common ways of distributing them. These lessons are necessary to emphasize the third point in my paper and that is that our biology courses are an excellent training for citizenship.

Twelve years ago, when the American association met here in New York, one of the foremost biologists in this city read a paper in which he emphasized the importance of biology in the development of citizenship. While I will confess to you that I had not, up to that time, thought of our courses as especially valuable in this respect, I have never since lost sight of its possibilities.

Heretofore, I have been quite willing to let the philosophers and the theorists discuss the subject matter best adapted for the development of citizenship. The subject belongs largely in the

field of the general and the abstract where the philosopher revels.

It is my opinion that the biological sciences can supply excellent material for the development of citizenship and I propose to offer some definite suggestions that show what we can contribute to this work. A citizen is a person who is born in the United States or who has been naturalized here, who owes allegiance to *his* country, *his state*, and *his city*, and who is entitled to their protection. The opposite to a *citizen* is an *alien*. Our war has emphasized the importance of eliminating the aliens and educating the citizens.

Mention has been made that we teach the importance of bacteria in relation to human welfare. Our pupils know the danger of infection from milk, why unsanitary stables are a menace and why the men working in the stables should not come from homes where there are communicable diseases. They know that milk should be subjected to a low temperature at once, why it should be Pasteurized, and the care it should have while on the way to the city. This is equally true of meats and vegetables. Our pupils know the danger from inattention to the water supply. They appreciate the importance of clean streets. Their knowledge of epidemic diseases will cause them to favor and insist upon an efficient board of health. They have sane reasons for supporting regulations relating to quarantine vaccination and disinfection. They have a more intelligent interest in the care of our parks and the trees of the city. Such educational institutions as the botanical gardens and the American museums will get their hearty support for they appreciate what these institutions stand for. They have a more intelligent interest in, and a greater loyalty for their city. They are better equipped to assume the duties of citizenship.

It is possible that the advocates of general science, who by the way, are chiefly teachers of physics and chemistry, will tell you that their course does all this and a great deal more. My answer is that it would be better to have two years to do the work outlined in biology. When they give the biology work a minor place in a year's course, they simply mutilate it. Pupils grasp

the great questions of life only after having studied them in a reasonably wide range of individuals. In comparing the value of the two courses, do not lose sight of the fact that our work is a matter of record and we are perfectly willing to be fairly judged by what we have done and are doing. Theirs is all theory and argument. I have never heard a general science advocate give a concise, constructive argument for its substitution for biology. They will tell you that it has made good in the West, and that it is spreading everywhere. There are several reasons why I am not much impressed with that argument. First, the West is a long way off and it is not possible to get definite facts as to how successful their work is. Second, the universities of the Middle West are less exacting in their conditions for admission. This leaves plenty of time for three or four years in science courses. Such conditions will offset the handicap of one inferior course. In the third place, I have personally admitted to our courses pupils who have been trained in general science in schools at Minneapolis, Chicago, Washington, D. C., Massachusetts, Connecticut, Pennsylvania and New Jersey. This list includes one pupil who was taught by the author of one of the well-known books in general science. In every instance, I examined the laboratory note book, in case the pupil made one, and the results make me more emphatic in saying that general science, as taught at the present time, is not well organized.

And now, in conclusion, to revert to the title of my paper, the changes that I would suggest are not so much the content of the course as the question of emphasis. I would urge, first, more time on the fundamental processes of living things. This is the most important part of the work and unless we get our pupils to understand them, by teaching them over and over again, we will lower our course until it is on a level with general science. Second, wherever possible, I would teach these principles by means of forms that have an important relation to human welfare. Third, I would emphasize facts in our course that train for citizenship.

ERASMUS HALL HIGH SCHOOL,
BROOKLYN, N. Y.

THE RELATION OF FIRST YEAR BOTANY TO ADVANCED WORK, WITH REFERENCES TO CERTAIN APPLICATIONS AND BY-PRODUCTS

By Paul B. Mann

The present fluid and even kaleidoscopic status of elementary biology in New York City high schools, reminds me forcibly of a bit of doggerel which appeared years ago in Harper's Magazine. A colored man had been exercising his mule in the plantation garden, but an altercation arose between them, resulting in the sudden juxtaposition of Rastus' head with the distal extremity of one of the mule's hind legs. Rastus went to sleep. Later consciousness began to dawn and he sat up and soliloquized in a mournful way, beginning:

"Is dis yuh me, or not me,
Or hab de Debil got me?"

We will all grant that the world needs men and women of scientific imagination and better viewpoints. "Where there is no vision, the people perish." The march of progress can be checked by observing the scrap heaps along its highway. But one might well be perplexed when one finds any inconoclastic authority throwing bodily to the discard-pile, a vehicle which is having one of the most conspicuous careers in advancing human achievement and aspiration.

I have not only hope, I have faith that even arbitrary action can not finally overthrow biology nor displace it permanently from its position as a science of fundamental values for adolescents, as well as adults.

The most discouraging phase of the present situation in the New York City high schools, it seems to me, is the possibility of a hasty, unpedagogical *ipse dixit*, unsupported by judicial and scientific investigations.

Dr. Josephine Baker, in a recent lecture, spoke of the tremendous need of conserving the Belgian children *now*, from rickets and tuberculosis, if Belgium is to be! We know, but sometimes forget, how truly the structure of the nation of to-

morrow is being builded today. But how can the nation have well rounded and stalwart thinkers in its tomorrow if the educators are given the children (the raw material), and then immediately handicapped not only as to tools but as to methods of development? The men and women who were pupils in such a system, will some day declare the bitterness of such injustice.

Of the many contributions which elementary botany and biology make for advanced courses in the school and for later life, I wish to refer briefly to five.

In the first place, the subject of human reproduction is intimately associated with the highest hopes of humanity, and yet is connected with some of the most sordid problems of the race. The very insistence of the sex problem compels a genuine answer from the schools. That answer must be sound, thorough and immediate. Let me quote a line from a letter just received from a Y. M. C. A. worker in France. "It is our former American interpretation of those two terms [*morale and morality*] that disturbs me in trying to consider what America will feel toward and do for her men who are soon to return to her. Is she going to continue to say that there is no sex problem in life, or is she going to face it squarely and try to solve it?" Those who have studied the problem of presenting sex matters to children and have taught biology, know that to avoid the pitfalls there must be a natural and unforced approach. There is absolutely no substitute for the normal, logical procedure of our elementary biology courses, dealing first with fertilization in the flowering plants, then in a typical animal like the fish or the frog. Neither of these topics when presented is tied up with sex-hygiene, there is no self-consciousness, and there is built up a natural foundation for all later applications, whether of sex-hygiene of one sort or another, or the justifiable expectations of the instructor in advanced botany or zoölogy.

In the second place, the stress given to hygiene, now continued throughout the entire high school course, might lead some to a presumption that elementary biology could fairly be dispensed with, in view of the probable(?) duplication of subject matter and treatment. However, the situation is far from being

so palpable. There need be little duplication. In addition, since the hygiene is largely deductive, it presupposes thorough grounding in biologic principles and bases. Military autocracy can be exemplified by the lines "Theirs not to reason why," but the full coöperation of the average hygiene student, and indeed every adult as well, in health endeavors as in other lines of action, is gained not only by knowing that "there's a reason," but knowing what that reason is. First year biology supplies abundant reasons. There is neither time, with only one hygiene period a week, at the most, nor is there continuity enough possible, to teach the content of a full year of biology by means of such a hygiene subterfuge. Daily contact with the experimental evidence of the laboratory is requisite for mental digestion and assimilation of principles, and to develop the scientific viewpoint. Last term, for instance, one of my hygiene classes had to be excused from one week's recitation on account of a holiday, and the next week did not recite for another reason. That meant that they went three weeks without a single recitation!

Nor is there much encouragement for the man who feels on the other hand that general science presents enough biology to be a worthy substitute. I shall not enter into the relative merits of these two subjects. Each has its place. However, the amount of biology presented in a year of general science is too frequently insignificant.

In the third place, have we any moral right to deprive students of the cultural values which are unquestioned by-products of elementary biology? Whatever philosophy of life each student comes eventually to formulate, early or later, will hinge on living things and their relation to metaphysical questions. The drama of life is unbalanced and ill-proportioned if viewed through anthropocentric lenses. Literature is full of references to nature. Shall we send our pupils out into the world, into nature itself, refusing them the key to the interpretations of biologic phenomena? For each student, is due at least the opportunity of an esthetic appreciation of the wonder of life and of the utility and beauty of its types, whether diatom or humming bird, scaled mosaic from a butterfly's wing or the

perfect spiral of the chambered nautilus. In this connection, Professor Curtis writes as follows:* "The writer remembers how when a student he was taken by the 'Mosquito-Malaria Theory,' as it was then called; and at a later date the esthetic appreciation with which he contemplated the apparent explanation of Mendelian segregation and of the determination of sex in terms of the behavior of chromosomes. In spite of uncertainties and the need for further investigation, one felt himself gazing at a picture near enough completion to show what it might become —a sequence so wonderfully ordered as to call forth an esthetic fervor."

Then again, how without studying elementary botany, can we count on an intelligent citizenry, a citizenry personally interested in forest conservation, individual, municipal, national and inter-national nutrition, including problems of soil fertility, crop production, plant diseases and insect pests, improved methods of transportation and preservation of foods, selection and utilization of proper woods, and a host of related problems, such as the substitution of kelp as a potash source, the ascertaining of new plants yielding rubber, etc., not to speak of applied bacteriology and commercial products. The balance of the year of biology includes the bases for the conservation of fishes, birds and other wild life and the economic relations of hundreds of animal types, from parasites to makers of silk, producers of fur, buttons, oil and so forth, together with an intelligent appreciation of rational living for humans, themselves.

The significance of botanical training has been lately tested in a large way. We know how thousands of boys and girls sprang with avidity to the gardens and farms of the nation, during the past two years, and applied there the laboratory methods of their botany and biology courses. Furthermore, they were trained and ready to interpret the dietetic problems for the rest of the family and thus they kept up the family morale by doing their full share in emphasizing all phases of Hooverizing.

Then there are legislative opportunities. For instance, to refer to only one example among many, last year we needed

* Science, June 14, 1918.

intelligent legislators, with biological training to pass the Week's Bill, prohibiting the uninspected importation of nursery stock into the United States, and thereby preventing the introduction of plant diseases and obnoxious insects. New bills of biological import will continue to be introduced at Washington and in the state legislatures and there will be even more call for their intelligent consideration. Shall we turn back the hands of the clock and parallel the situation in Pennsylvania in 1885, when an unbiologic legislature spent in hawk bounties, directly and indirectly, nearly $4,000,000 to save a paltry $1,875 worth of poultry?

Finally every one recognizes the growing emphasis that the latest decade has given scientific achievement and progress. This appreciation has been reflected in many ways. From a botanical standpoint alone, professional activities have had to grow by leaps and bounds, in order to keep pace with the demands of the hour. Forestry has expanded into a ranking science, the Bureau of Plant Industry has had to continuously increase its staff, plant pathologists are called upon daily to save thousands of dollars' worth of plants by prophylaxis or treatment, pharmaceutical stations have been inaugurated, new plants are being originated by scientific breeding, the Office of Foreign Seed and Plant Introduction have brought to us valuable exotics and have also raised the bars of quarantine against "undesirable" foreign plants, physiological chemists and bio-chemists are everywhere at work on problems of soil fertility, fabric utilization, by-products of plant origin, and the like. Yet I have merely suggested some of the types of botanical activity, without reference to even a complete resumé.

Some of us may not realize the extent to which the national government and the states have fostered the development of the agencies calculated to answer the agricultural demands of this country.

In one of the weekly news letters of last summer, Secretary Houston, of the Department of Agriculture, pointed out that there are 67 agricultural land grant colleges and experiment stations in the United States, with an equipment of $195,000,000,

a teaching staff of 5,900 and a resident student body of over 75,000.

On May 15, 1862, Abraham Lincoln signed the act, creating the great Department of Agriculture. In the 57 years intervening, there has never been a time when the country at large has been so appreciative, as at present, of the value of this department, nor so cheerfully contemplates the expenditure of approximately $65,000,000 for its supporting annual budget, to maintain its staff of more than 20,000 people.

Furthermore, on May 8, 1919, there was enacted the Extension Act, which provides that all extension and demonstration work shall be coördinated and carried on coöperatively by the state colleges of agriculture and the Federal Department of Agriculture. After 1922, there will be available approximately $8,700,000 for a the support of this Act. The field work in each state is supervised by a director of extension and is done by (1) men county agents, (2) women county agents, (3) boys' and girls' clubs, (4) corps of specialists.*

If, as Professor Ames† and many others contend, the war was really won by science, either pure or applied, then there is an everlasting debt which humanity owes to the men of science: the physicians, engineers, sanitarians, meteorologists, geologists, botanists, zoölogists, physicists and chemists. Their service sustained the world at the time of its greatest need. What I want to emphasize is that the careers of these men and women were made possible to them and to the country by their courses in the high school period of their education, when they were self-discovered and when they unquestionably got the trend for their particular vocation.

Shall we not continue to need trained botanists, not to speak of other biologists? Let us keep *wide open* the door marked "Biologic Science" and let *all* the students of our high schools have an unobstructed view of whatever perspectives and vistas they can see.

This then is what I have attempted to present:

* Weekly News Letter of Department of Agriculture.

† Science, Oct. 25, 1918.

First, the imperative need of a natural biologic approach for the presentation of rational sex hygiene.

Second, the weakness of the attempt to teach hygiene without previous biology foundation, also the impossibility of successfully substituting either hygiene or general science for biology.

Third, the moral demand upon us to supply through biology courses, the working material for individual culture and philosophy.

Fourth, the necessity of popular biologic education to insure worthy legislation.

Fifth, the loss to the country and to the individual concerned, of not discovering those whose talents and genius lie in the line of biologic heritage.

EVANDER CHILDS HIGH SCHOOL,
NEW YORK CITY.

REVIEWS

Trelease's Plant Materials and Winter Botany*

These two valuable pocket volumes contain a great amount of clear and condensed information about trees and shrubs. The former takes up 247 genera, 782 species, 1,150 forms. It is intended to enable any careful observer to learn the generic and usually the specific name of any tree, shrub or woody climber, likely to be found in cultivation in the eastern United States, except the extreme south. The concise key to genera, separate for trees, shrubs, undershrubs and woody climbers, emphasizes vegetative characters. In the main part of the work the genera are more fully described and keys lead to the species and forms. In a few genera such as *Crataegus*, *Cotoneaster*, *Philadelphus* and *Rosa*, only the most easily recognized species have been admitted. Trees and shrubs of the orchard are traced to their species.

The larger "Winter Botany" much surpasses any existing work as a practical means of identifying cultivated trees and shrubs in

* Trelease, William. Plant Materials for Decorative Gardening. The Woody Plants. Pp. 204. 1917. Price, $1.00.

Winter Botany. A companion volume to the above. Pp. xi + 394. Illustrated. 1918. Price, $2.50. Both published by the author, Urbana, Ill.

winter. The introductory key to genera by winter characters covering thirty pages is very interesting, the first division being according to whorled, opposite or alternate arrangement of leaves. The genera and species are then taken up with. It contains numerous excellent line drawings especially of leaf-scars and buds. There are many references to other works. The nomenclature follows Bailey's Standard Cyclopedia of Horticulture, synonyms being given where manuals differ.

The implied future publication of a similar work for herbaceous plants will be awaited with interest.

A. Gundersen.

PROCEEDINGS OF THE CLUB

January 14, 1919

The annual meeting was held in the lecture room of the Department of Botany at Columbia University. President Richards called the meeting to order at 8:15 P.M. There were 20 persons present. The minutes of Dec. 10, 1918, were read and approved.

The nomination of Dr. George E. Osterhout, Windsor, Col., Mr. S. A. Lurvey, South West Harbor, Me., and Miss Anna G. Runge, 577 Ninth Av., Astoria, N. Y., followed.

Mr. Percy Wilson read the report of the Field Committee which was accepted. The report of the Program Committee, Mrs. E. G. Britton, chairman, was read by Dr. Seaver. A suggestion that in the future some of the Tuesday meetings should be held at Columbia University was discussed by Prof. Harper, Prof. Hazen, Dr. Barnhart and Mr. Taylor.

Dr. M. A. Howe reported briefly for the Committee on the Fiftieth Anniversary Celebration. A statement of the receipts and expenditures, as follows, was read:

Semi-Centennial Fund

Receipts

Amount received in 1917	$1,580.50
Amount received in 1918	548.00
	$2,128.50

Disbursements

Paid the New Era Co. Printing Memoir, Etc.	$1,373.67	
Engraving	153.87	
Cartage	2.00	
Envelopes	3.60	
Editorial Expense	3.85	$1,536.99
Balance		591.51

The treasurer reported on the estimated cost of reprinting Vol. 15, No. 9, of the *Bulletin*. It was voted to have this number reprinted at a cost not to exceed $40 for 100 copies. The secretary was directed to call the editor's attention to the announcement on the cover of the *Bulletin*, relating to holding the Tuesday evening meetings of the Club at the American Museum or Columbia University.

The resignations of Miss Henrietta Lisk, Dr. L. O. Kunkel and Mr. James G. Scott were read and accepted.

Miss Runge, Mr. Lurvey and Dr. Osterhout were then elected.

Reports of officers.

The secretary read a report which was accepted.

The treasurer's report was read and referred to an Auditing Committee consisting of Mr. Norman Taylor and Dr. Francis Pennell. A statement of the receipts and expenditures of the Club follows:

Receipts

Balance, Corn Exchange Bank, January 7, 1918			$1,735.27
Members' dues		$ 970.00	
Sustaining members' dues		90.00	
Bulletin		1,043.22	
Torreya		183.98	
Torreya, gift		100.00	
Advertising		72.00	
Memoirs		641.01	
Index cards		170.28	
Sundries		1.05	
Semi-Centennial Fund		548.00	
Interest, Underwood Fund:			
From Bank	$50.00		
From Bond	14.90	64.90	
		$3,884.44	$3,884.44
			$5,619.71

DISBURSEMENTS

Bulletin	$2,473.29	
TORREYA	625.41	
Index cards	307.29	
General expenses	440.62	
Advertising	3.20	
Memoirs	1,512.97	
	$5,362.78	$5,362.78
Balance, Corn Exchange Bank		256.63
Funds on deposit Union Square Bank		
Union Square Savings Bank Fund	576.55	
Underwood Fund	769.82	
Underwood Fund Bond	1,000.00	
	2,346.37	$2,346.37
Total cash on hand		2,603.00

The treasurer was directed to ascertain the cost of insuring the stock of the Club's periodicals which are stored in the basement of the library.

The report of the editor, A. W. Evans, was read by Dr. M. A. Howe. This report was accepted.

Mr. Norman Taylor gave a brief report as editor of TORREYA and Dr. M. A. Howe reported upon his work as delegate to the council of the New York Academy of Sciences.

Dr. Howe brought up the question of the publication of a paper offered by Dr. F. W. Pennell for publication as a *Memoir* of the Club. A motion was made by Mr. Taylor to refer the question to the Budget Committee and to the Editorial Board for their joint consideration and report. The motion was carried.

Election of Officers.—The following officers were elected for the ensuing year:

President, H. M. Richards.

Vice-Presidents, John Hendley Barnhart,
C. Stuart Gager.

Secretary and Treasurer, Bernard O. Dodge.

Editor, Alex. W. Evans.

Associate Editors,

Jean Broadhurst,	M. Levine,
J. A. Harris,	George E. Nichols,
Marshall Avery Howe,	Arlow B. Stout,

Norman Taylor.

Delegate to the Council of the New York Academy of Sciences, M. A. Howe.

The president appointed the standing committees for the year. A list of these committees is regularly published in TORREYA.

Adjournment followed.

B. O. DODGE,
Secretary.

JANUARY 30, 1919

The meeting was held in the Morphological Laboratory of the N. Y. Botanical Garden at 3:30 P.M. President Richards presided. There were 17 persons present.

The minutes of Jan. 14 were read and approved.

The following report of the Budget Committee was read and adopted:

Report of Budget Committee, 1919

The Budget Committee of the Torrey Botanical Club met at the New York Botanical Garden at 2 P.M., on January 29, 1919. Present, Drs. Barnhart (chairman), Britton, Dodge, Evans, Harper, Howe, Richards and Rusby. The following budget was suggested for the year 1919:

Estimated Income

Dues	$1,000
Sustaining members	100
Bulletin	750
Torreya	180
Memoirs	100
Advertisements	50
Index cards	200
Interest	90
Sundries	75
Total	$2,545

Estimated Outgo

Bulletin	$1,400
TORREYA	525
Memoirs	000
Index cards	200
Secretary-Treasurer	300
Sundries	120
Total	$2,545

Respectfully submitted,

MARSHALL A. HOWE,
Secretary.

Dr. Barnhart, chairman of the Budget Committee, reported that all members of the committee were present at the meeting.

The treasurer was authorized by vote of the Club to insure the stock of the Club's publications, against loss by fire and water, for four thousand or five thousand dollars.

Dr. Britton moved to appoint Dr. M. Levine, business manager of the Club's publications for purposes of increasing advertising and circulation. Motion carried.

Dr. Pennell reported that the Auditing Committee had examined the books of the treasurer and had found them to be correct.

The scientific program was then in order. The program consisted of "Abstracts and Criticisms of Botanical Papers read at the Baltimore meeting of the A. A. A. S."

Prof. R. A. Harper, Dr. E. W. Olive and Dr. A. Gundersen each reported on several papers which he had heard read.

Discussions followed.

The meeting adjourned at 5 P.M.

B. O. Dodge,
Secretary.

A CORRECTION

Syntherisma pruriens, error in publication. By an unfortunate slip of the pen in transferring *Panicum pruriens* Trin. to another genus in the preceding March number of Torreya (**19**: 48. 14 May 1919) the generic name was made to read "Sanguinale." This orthographic error should be corrected to *Syntherisma pruriens* (Trin.) nom. nov., the date of publication remaining 14 May 1919, the actual date of issue of the March number of the journal.—J. C. Arthur.

NEWS ITEMS

Dr. William S. Cooper, of the University of Minnesota, expects to spend the summer in a study of the ecology of the dunes at the mouth of the Salinas river, near Monterey, California. As the climax vegetation of these dunes is chaparral, Dr. Cooper's work will be an extension of his former study of that formation.

The Ecological Society of America will hold a meeting at the Throop College of Technology, Pasadena, California, on June 19, 20 and 21st. A joint session for the reading of papers of general interest will be held with the Western Society of Naturalists. Field trips have been arranged to Mt. Wilson and to the fossil deposits at Rancho La Brea.

The Ecological Society of America announces in its *Bulletin* the appointment by the president, Barrington Moore, of a "Committee on Cooperation." The aim is to further different phases of ecological work by combined effort on a concrete problem and to suggest a list of problems where such co-operation would prove of value. The problem decided upon is "The factors limiting distribution on the mountains in the northeastern states." The members selected represent the three main lines of work of the society, plant ecology, forestry and zoology. They are: for plant ecology, H. L. Shantz of the Bureau of Plant Industry, Washington, D. C., and Norman Taylor of the Brooklyn Botanic Garden; for forestry, George P. Burns of the University of Vermont, Burlington, Vt., and Barrington Moore of the American Museum of Natural History, New York; for zoology C. C. Adams of Syracuse University, and one other not yet appointed. During the first week in June, Messrs. Moore, Adams and Taylor visited Mt. McIntyre and Mt. Marcy in the Adirondacks, and a more extended trip of the whole committee is scheduled for July.

TORREYA

Vol. 19 May, 1919 No. 5

A NEW RICCIA FROM PERU*

By Alexander W. Evans

Through the kindness of Mr. W. R. Maxon, of the United States National Museum, the writer has received for study an interesting collection of Peruvian Hepaticae, made by Messrs. O. F. Cook and G. B. Gilbert in 1915. One of the most remarkable of the species represented is the *Riccia* noted below, which seems to be undescribed. The remaining species are not yet wholly determined, so that a complete account of the collection can not be published at the present time.

Riccia bistriata sp. nov.

Plants growing in irregular patches: thallus simple or once or twice dichotomous, strap-shaped to obovate, mostly 0.5–1.5 cm. long, 2–4 mm. wide, and 0.5–0.6 mm. thick in the median portion, distinctly areolate and dull green above, a marginal band becoming bleached with age, more or less pigmented with purple below, especially toward the margin, median sulcus in the apical region only, 1–1.5 mm. long, the older portions of the thallus plane or nearly so above and convex below, gradually thinning toward the margin, where the two surfaces meet at an acute angle; ventral scales inconspicuous, hyaline, scarcely projecting beyond the margin; cells of the primary dorsal epidermis subhemispherical, the upper part soon collapsing and disappearing, leaving the basal portion in the form of a thickened shallow cup; green tissue of the usual *Riccia* type, consisting of upright rows of cells separated by narrow (usually) four-sided canals not constricted at the dorsal surface of the thallus, each row of cells usually connected longitudinally with four other rows and composed of five or six cells, the longitudinal walls common to two rows being marked by two colorless bands of thickening

* Contribution from the Osborn Botanical Laboratory.

[No. 4, Vol. 19 of Torreya, comprising, pp. 57–84, was issued 25 June, 1919]

extending from the compact ventral tissue to above the middle of the uppermost green cells, united at their upper ends and sometimes at various points along their length; compact ventral tissue mostly eight to ten cells thick, composed of uniform parenchyma without oil-bodies: inflorescence (so far as known) dioicous, the antheridia not seen: spores dark brown to almost black, becoming very opaque with age, more or less angular, 110–130 μ in diameter, with a narrow, irregular and often interrupted wing-margin, 4 μ or less in width, spherical face covered over with a fairly regular reticulum formed by low ridges 3 μ or less in height, the meshes mostly 10–15 μ in diameter, plane faces with lower ridges, usually irregular but sometimes forming a more or less distinct reticulum. [FIG. 1.]

On soil, Santa Ana, 900 m. alt., June 25, 1915, *Cook & Gilbert 1481*.

The peculiar bands of thickening which are found in the walls of the green cells represent a feature which has not before been noted in the Marchantiales. In a section cut parallel with the surface of the thallus (FIG. 1, D) these bands are especially conspicuous. They appear in the form of minute circular structures situated in the walls common to two cells and projecting into the cavities, this appearance being due to the fact that the thickenings deposited by one cell correspond with those deposited by its neighbors. In most cases each cell is octagonal in section and is bounded by four other cells alternating with four air-canals. At its periphery it shows normally eight thickenings, two for each bounding cell. The thickenings are usually distinct and definitely two in number, but they sometimes have vague outlines and may be increased to three. In a section cut at right angles to the surface of the thallus (FIG. 1, E) the true form of the thickenings becomes evident. They now appear as parallel bands, running longitudinally with respect to the rows of green cells. Each pair of bands begins at or near the lower end of a row and extends upward to the cells just beneath the epidermis. A short distance above the middle of these cells the two bands coalesce and form a narrow arch. During their course they sometimes unite here and there but are usually quite free from each other.

Although thickened walls have not before been observed in the

green tissue of the Marchantiales, thick-walled cells of various types have repeatedly been noted in other parts of the thallus, especially in the more complex genera of the Marchantiaceae.

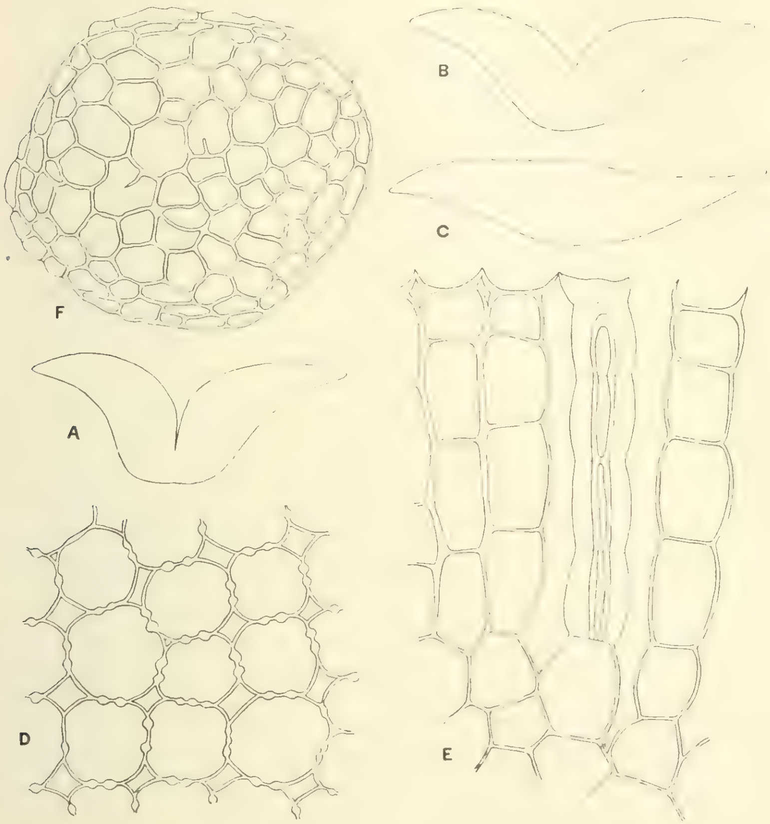

FIG. I. RICCIA BISTRIATA Evans.

A. Cross section of thallus in apical region, × 22. B. Cross section of same thallus near basal end of median sulcus, × 22. C. Cross section of same thallus in older part, × 22. D. Section of green tissue parallel with surface of thallus, × 300. E. Section of green tissue perpendicular to surface of thallus, showing bands of thickening in section and surface view, × 300. F. Spore, × 400. The figures were all drawn from the type specimen.

In addition to the tuberculate rhizoids which are of almost universal occurrence, the epidermis in many cases is distinguished by a definite cuticle and conspicuous trigones, while the cells

surrounding the pores sometimes show thickened radial walls. In the compact ventral tissue, moreover, thick-walled cells with elongated pits are not uncommon, and a number of species are known in which pointed sclerotic cells with pigmented walls can be demonstrated. Of course none of these cells bear much resemblance to the green cells of the *Riccia*. Perhaps the latter are more directly comparable with the parenchymatous cells found in the costa of *Pellia epiphylla* (L.) Corda and *P. Neesiana* (Gottsche) Limpr. Here, as in all the Jungermanniales, the gametotype is destitute of air-spaces, but the interior cells of the thallus show distinct vertical bands of thickening in their longitudinal walls. The bands, which are narrow and often pigmented, undoubtedly serve in a mechanical capacity, and the same thing is probably true of the much longer bands of *Riccia bistriata*.

According to Stephani* twenty-three South American species of *Riccia* were known in 1898, thirteen belonging to *Riccia* proper and ten to *Ricciella*. Not one of these species is accredited to Peru. In 1911 Weberbauer† was able to report two species from the vicinity of Mollendo, listing them under manuscript names of Stephani. Since these species have not been adequately published, so far as the writer knows, they need not be further considered. Among the species described by Stephani, *R. Weinionis* Steph., collected by Weinio at Rio de Janeiro, is perhaps the most closely related to *R. bistriata*. In the Brazilian species, however, the spores are smaller, measuring 102 μ in diameter, the inflorescence is described as monoicous, and the dorsal sulcus is not restricted to the apical region. It is unfortunate that Stephani makes no allusion to the anatomical features of his species, nothing being said about the epidermis, the green cells, or the compact ventral tissue.

Sheffield Scientific School,
Yale University

* Bull. Herb. Boissier **6**: 310–343, 361–378. 1898.

† Engler & Drude, Vegetat. der Erde **12**: 145. 1911.

WHAT IS ECOLOGY?

By H. A. Gleason

At a recent meeting of a well-known botanical society it was suggested somewhat jocularly that the field of plant ecology is not well defined, and that the speaker would welcome a further definition of the phases of plant life that are covered by it. Now the botanist who made this remark certainly does know what ecology is. So do also the various botanists who have made and are still making similar public statements on the same subject and to the same effect. They know from actual experience with the subject itself and with the men who work in it. The difficulty is that ecology is so different from the more familiar divisions of botanical science, morphology, physiology, and the like, that some of them fail to classify the subject properly in their own minds.

In order to present the matter, let us attempt a definition of botany, to be used as a point of departure in formulating later a definition of ecology.* Botany is the accumulation and organization of knowledge of plants. This definition holds for the student who learns from the printed page or the observer who takes his knowledge directly from the plant; for the beginner acquiring the most elementary rudiments of the science or the investigator extending the limits of knowledge. Botany does not properly refer to the plant itself, although it is sometimes used in that sense. A speaker may refer to the interesting botany of Mexico when he really means the interesting flora.

Morphology, as one branch of botany, may be defined by the addition of one limiting phrase to the definition of botany: it is the accumulation and organization of knowledge concerning the form and structure of plants. Strictly speaking, the term does not refer to the plant itself, yet in common usage it has frequently been applied in that way. For example, a teacher may ask of a student "Describe the morphology of the corn-kernel," when he really expects a description of its structure. Or he writes an article on the morphology of the vascular bundle of corn, and the title is accepted without criticism as referring to the structure

* In this connection see Torreya for May, 1912.—Ed.

of the bundle and not to our knowledge of its structure. This sounds like mere quibbling over the meaning of words: so it is introduced to show that a word originally applied to a division of knowledge is now applied to certain features of a plant. The same thing is true of physiology, of pathology, of various other -ologies, not merely in the general field of botany but in other sciences as well.

To revert to the original subject, plant ecology may be defined as the accumulation and organization of knowledge concerning the correlation between the plant and its normal environment. It now becomes difficult to divert the word from the meaning given here into a concrete application as has been done so successfully with morphology and physiology, because the subject is based not on the plant alone, but on the plant and its environment together. Nevertheless, the attempt is frequently made.

A botanist announces that he is studying the ecology of Smith's Bog. Narrowed down to an exact statement by careful questioning, he admits that Smith's Bog has no ecology, that he is really interested in the environmental relations of the plants there, and that he discovers these relations, at least in part, by observations on their form and behavior. Undoubtedly the original statement has brevity and is clear in its meaning, but it is impossible to include consistently any measurable or visible process or structure in a plant exclusively under the term ecology.

Two common expressions of this correlation between plant and environment are found, as just stated, in the structure and behavior of the plant. They must be studied by the methods of morphology and physiology, they must be described in the same terms used in morphology and physiology, yet the result of the study is neither: they deal with the structure and behavior of the plant, the result deals with the correlation between its structure and behavior and the environment. The elongation of the dandelion scape is a study in physiology, the structure and development of the pappus a study in morphology, the dissemination of the dandelion a study in ecology. But since the observable effect of the interrelation of plant and environment is frequently termed the morphology or physiology of the plant,

there is a not unnatural tendency on the part of morphologists and physiologists to consider ecology, or at least this part of it, as equivalent to or included in their own subjects. Since these subjects have accepted names, they ask "What is ecology?"

Another expression of the interrelation between plant and environment is seen in the restriction of a species to a particular type of environment, that is, to a particular habitat. This phenomenon can not be observed on a single individual, which is of course restricted to a single station, but must be studied from many individuals of one race. In this case the visible result is apart from either morphology or physiology, and to some botanists this alone is ecology, just as the behavior of a plant is physiology. But after all, the habitat-relation of a species is only one type of behavior, dependent upon the physiological functions of the single individual, but measured and tested by the behavior of many individuals or of the race.

It is hardly necessary to say that tangible or visible phenomena are frequently noticed before the underlying processes or correlations are discovered. Starch was known before photosynthesis; growth of trees before cambium. The morphological effect of ecological relations, such as alpine dwarfing, was known before the causes, which are even yet not fully understood. Plant associations were described long before their fundamental nature was appreciated.

In conclusion, let it be repeated that ecology is a division of knowledge, to be studied only through perceptible phenomena, which are frequently structural or functional in nature and therefore subjects for morphology and physiology also, but that the questions which ecology seeks to answer, the knowledge which it aims to supply, deal not with structure and function alone but with the correlation between the plant as a whole and the environment in which it grows.

New York Botanical Garden

A NEW CALIFORNIA CYPRESS

Cupressus nevadensis sp. nov.

By L. R. Abrams

Small tree attaining a maximum height of 20–25 m. and a diameter of 6–8 dm., with spreading branches forming a broadly conical crown. Bark fibrous, longitudinally fissured, 15–25 cm. thick, reddish brown within, weathering light gray-brown on the exposed surface. Leaves light green and somewhat glaucous, closely imbricated on the slender distinctly 4-angled branchlets, 1.5 mm. broad, sharply acute and keeled, with a conspicuous active dorsal resin duct. Cones solitary or clustered, broadly oblong to subglobose, 20–25 mm. long about 20 mm. broad, light gray with a brown undertone; scales 6–8, rugosely roughened with the wrinkles converging at the umbo, the upper lateral longer than broad and acute at the upper angle; umbose on the lateral scales near the apex, scarcely pointed, those of the upper pair elevated and pointed; seeds numerous, 4–5 mm. long, light brown tinged with purple and somewhat glaucous, rugosely wrinkled and sparsely papillate; hilum oblong-oval.

In its resinous character it suggests *Cupressus Macnabiana* Murr., but the larger cones and glaucous seeds show a closer relationship to *Cupressus Sargenti* Jepson of the California Coast Ranges.

This species, the first to be reported in the main Sierra Nevada, was first discovered by Mrs. Leo Polkinghorn in 1907, who forwarded specimens to the late Professor W. R. Dudley. In 1915, recognizing the peculiarities of these specimens, the writer visited the grove for further material and notes on the living trees. It grows on Red Hill, Piute Mountains, near Bodfish, Kern County, at an elevation of 5,000 to 6,000 feet. Associated with the California juniper, blue Oak, digger pine, and such desert plants as *Pinus monophylla* and *Ephedra viridis*. Type: *Abrams 5368*, July 29, 1915.

Stanford University

REVIEWS

Macfarlane's the Causes and Course of Organic Evolution*

This is an unusual book in several particulars, and notably in its wide scope, covering nearly the entire field of evolution on the earth, from "Ether and Energy in the evolution of matter" (Chapter I) to such topics as "Morals as a factor in organic evolution and their biological origin" (Chapter XXIII), "Religion as a factor in human evolution" (Chapters XXIV–XXVI), "Human organization in relation to environment" (Chapter XXIX), and "Probable future advances in human evolution" (Chapter XXX). Chapters I to VIII deal with the evolution of energy and of matter, inorganic and organic; Chapter IX with the idea and term (first elaborated and used by this author) of "Proenvironment"; Chapters XI–XIII with "The evolution of plants"; Chapters XIV–XVIII with "The evolution of animals"; and Chapters XIX–XXX with the evolution of man and questions closely connected therewith in the realms, not only of the physical, but of the intellectual, moral, religious, and social.

It is unusual to find a recent book dealing with the evolution of plant and animal forms, and having only 28 illustrations; and equally unusual to find a book of such pretensions as this one disregarding, or considering only briefly or incidentally, some of the working hypotheses that loom largest in contemporary research and in recent scientific periodicals and other publications—such hypotheses as, for example, the mutation theory and Mendelism, and the recent work in genetics, and eugenics. This is in harmony, however, with what appears to be the author's attitude toward some of this later work. For example, noting that Mendel and "nearly all of his followers have treated of naked eye appearances" to the neglect of cytological details, and referring to his own well known study of "unisexual and bisexual heredity" (1883), where "there is no *dominance* or *recessiveness* shown," he "considers that most of the cases of

* Macfarlane, John Muirhead. The causes and course of organic evolution. A study in bioenergetics. New York, The Macmillan Co., 1918. Pp. i–ix + 875. 28 figs., three colored plates, and one uncolored. $4.00.

'Mendelian inheritance' in plants and animals will probably be found to conform to such conditions, where they have been studied microscopically." This not only implies that dominance and recessiveness are the essence of Mendelism, as conceived by present day geneticists, but is also contrary to certain published results of Mendelian studies. It must be kept in mind that macroscopic characters (*e. g.*, color and coloration) are often mass effects of histological detail. In fact, the author states definitely his opinion "that most of the discussion on the possible acquisition of new characters, on the hereditary transmission of such, on dormant (*sic*) and recessive factors, have mainly been of value in stimulating research" (p. 150), and he considers that "varietal, specific, generic, and wider characters resolve themselves into the waxing or waning of definite substances, according as environal stimuli act on certain constituents of the cells."

The keynote of the volume, as stated in the preface, is that "*energy, continuity, evolution* may be said to constitute the triune basis of existence"; and, further on (pp. 170–171), that "Relative distribution and relative condensation of energy . . . are the important factors at the foundation of all organic as of all inorganic changes." In fact, the viewpoint throughout, as the subtitle would lead one to expect, is that of energy, rather than form, and the elaboration of this conception involves the use of an unfamiliar nomenclature, originating with the author, and running throughout the book. Thus, "in passing from the inorganic crystalloids and colloids to those composing organic bodies, the fundamental need of the case was the evolution and increasing activity of an energy that would as far excel electricity in its perfect quality as does the latter excel chemical affinity, and it again heat" (p. 77). Heat, light, chemical affinity and electricity, as phases of energy, have been unequal to the task of energizing "the inert ether particles that form the centers of the atomic and molecular structures" (p. 81) and the author formulates it as a working hypothesis, "that the transition from the inorganic colloid to the organic colloid body was gradually accompanied by the evolution of a new and more condensed phase or modification of energy, the '*biotic*'" (p. 33). Biotic

energy is "the basic energizer of organisms,"and its "forerunner and anticipator" was "a redistribution of electric energy," which "distinguished chemists" consider "can be traced round each molecule" (p. 81). Biotic energy is "a more condensed, perfect, and powerful type of the all-pervading energy than even electric" (p. 26). The reviewer does not quite understand how one kind of energy can be more "perfect" than another. This adjective is frequently used throughout the book in comparing various kinds of energy (pp. 800–805). What is a "perfect" form of energy? How any of the lower forms of energy are converted into biotic energy is not known (p. 102).

Eight different kinds of energy are enumerated, viz., thermic, lumic, chemic, and electric, acting in non-living bodies; and biotic, cognitic, cogitic, and spiritic, acting only in living bodies. Biotic energy energizes protoplasm (*i. e.*, cytoplasm); cognitic energy energizes chromatin, it underlies the phenomena of irritability, awareness, response, and sense-perception. Cell division is "due to steady discharges . . . from the center of the nucleus or the nucleolus of cognitic energy," and conjugation "seems to be due to the establishment of unlike or differently charged amounts of cognitic energy," etc. In fertilization the "mutual" attraction of sperm and egg is not due to their molecules "as physical entities," but to definite discharges of chemic, electric, biotic, or other energies that transverse the particles," etc. Cogitic energy energizes the substance of the nerve ganglia (Nissl substance, neuratin). It is a "more perfect" (p. 801) form of energy than cognitic, and enables "organisms to form more complex and interlocked *impressions of a mental kind*" (p. 801). "There evidently exists a more complex form of energy than the biotic, cognitic, or even cogitic, and which we have termed the *spiritic*" (p. 801); and there is probably a specially complex substance in "the gray frontal matter of the brain, and which hypothetically we may call spiritin" (p. 804).

We have given considerable space to this unique conception and terminology because it is the unifying thought running throughout the book, and indicates the angle from which the entire question of evolution is conceived and discussed by the

author. Without implying any real analogy, one cannot help but recall here Harvey's statement in his epoch-making book, "The motion of the heart and blood in animals," viz: "Fernelius, and many others, suppose that there are aerial spirits and invisible substances . . . but Medical Schools admit three kinds of spirits: the natural spirits flowing through the veins, the vital spirits through the arteries, and the animal spirits through the nerves; . . . but we have found none of all these spirits by dissection, neither in the veins, nerves, arteries nor other parts of living animals." One is also reminded here of the primordial units of "mind-stuff," in which Clifford believed, though on evidence (so James tells us) that seemed quite worthless to Bain. It seems to the reviewer as though the author were reviving for the microcosm a conception analagous to that formerly held of the macrocosm, but long since abandoned in the light of the scientific investigation and interpretation of nature. The ancient polytheism, for example, postulated a spirit presiding over every natural process, and over every act of daily life—a god of the east wind, and of the west wind, of the sea and of the depths of the earth; a god of going out, and a god of returning home, a god of planting, and a god of harvest. So the book under review postulates a special kind of energy for the various kinds of functions, and each kind differs from all the other kinds in its "perfectness." A botanical reviewer may prudently refrain from a critical discussion of the purely physical question of kinds and qualities of energies, but it would be interesting and no doubt profitable, to hear what comments a physicist would make. An acceptance of the author's theory would demand a considerable readjustment of the mode of thought of contemporary experimental physiologists.

Another idea to which the author assigns much prominence and for which he coins a new term (as noted above), is "*proenvironment*" (Chapter IX, and *passim*). This is defined (p. 242) as "that great and ever-expanding law of organic life, by which varied environal stimuli are linked into a summated and unified response, that brings each organism into satisfied relation to the environment;" or again (p. 629), "the capacity of an or-

ganism for perceiving and then positively growing or moving toward an environment that is the most satisfying for it." The various tropisms, and the response of *Mimosa* leaves to shock are acts of proenvironment. "In all moral acts, as in simpler and more primitive actions and reactions amongst plants and animals, the fundamental outcome of moral response is a satisfied state" (p. 664). "Moral attitudes all represent proenvironal efforts by individuals" (p. 656). "Enterprise is varied and vigorous proenvironal planning that is being put into practice" (p. 641). "Sex fusion is a proenvironal act" (p. 789). "So the building of nests above ground, the excavation of nests below the surface, or the hollowing of trees into nests by ants and other insects; the gradual elaboration of complex log houses and dams by beavers; the planning and erection of a lake dwelling by medieval man are all proenvironal acts," etc. (p. 790). "Mankind has proenvironed the law, "Thou shalt love thy neighbor as thyself" (p. 791). The idea of proenvironment, or something closely akin to it, was proposed by Cockayne and Foweraker in their paper on "The principal plant associations in the immediate vicinity of Canterbury College Mountain Biological Station" (Trans. New Zealand Inst. **48**: 166. 1916). The term there proposed was *Epharmonic variation*, which was defined as "a change in its form of physiological behavior beneficial to an organism, evoked by the operation of some environmental stimulus." For the intellectual realm the idea is also stated by James in "The Will to Believe," where he says (p. 76): ". . . of two conceptions equally fit to satisfy the logical demand, that one which awakens the active impulses, or satisfies other aesthetic demands better than the other, will be accounted the more rational conception, and will deservedly prevail." The conception, however, appears to have been nowhere so thoroughly elaborated as by the author under review.

In Chapter VIII the author postulates the law of "Pentamorphogeny," that is, that there are five factors or cooperative agents in organic evolution, namely, heredity, environment, proenvironment, selection, and reproduction (p. 204). This is somewhat in contrast to Osborn's law of "Tetraplasy," the

"four inseparable factors of evolution" (heredity, ontogeny, environment, and selection). Macfarlane rejects ontogeny as a cause or factor in evolution.

In accepting the hypothesis "that living and non-living bodies are alike irritable" (p. 44), no reference is made to Bose's full development of that idea in his Response in the Living and Non-living, and other writings.

On page 81 "inert ether particles" are referred to as forming "the centers of the atomic and molecular structures." No reference is here made to the electron theory of atomic structure, which regards the atom as, in figurative sense, a miniature "solar system," with negative electrons moving in orbits around a nucleus of positive and negative electrons—chiefly positive. This hypothesis, based upon studies in radioactivity and related investigations, has been the one in most general favor with physicists for a decade or so. Attention may also be called here to a present tendency of some physicists to question the older conception of a universal elastic ether, in light of the theory of relativity, which originated in the famous *experimentum crucis* of Michelson and Morley (1887) to obtain evidence of an ether drift." In fact, a physicist friend has assured the reviewer that the expression "inert ether particles" does not convey any meaning to a physicist.

Adhering to the energy point of view, and the point of view of a granular or atomic ether, protoplasm is defined (p. 86) as "a definitely correlated rotatory motion of variously energized (or linked) and highly complex groups of ether particles of colloid nature, in which the specific rates of motion between the groups are an expression of biotic energy." This would seem to define protoplasm as a mode of motion rather than as a substance. In harmony with this conception, life is defined (p. 97), as "Relatively similar complexity and synchronism of motion of quinary, hexary, and heptary compounds, that represent similar complex definiteness of structure and similar lines of flow of biotic energy."

The different tropisms shown by living organisms depend each upon a special class or kind of plastids or energids which "show a

special sensitivity and polarity to environal stimuli (p. 121); these plastids evolved in the probable order of leucoplastids (chemoenergids), helioplasts (chromoplasts and chloroplasts) or photoenergids, geoplasts (geoenergids), thigmoplasts (mechano-energids), and parohelioplasts, which "are only known in their energizing results, not as yet as definite structures. Thus for every class of physiological function there is postulated by the author, not only a particular kind of energy, but also a particular structure. Some of these structures are known only by inference from a given function. This granular philosophy is extended to include the notion that there is "a large series of bodies common to all plants . . . which can at any time be gradually reproduced by the joint action on, and reaction of protoplasm and its related ferments under the more fundamental action of appropriate environmental stimuli." These bodies may at times be reduced to ultra-microscopic bodies (p. 150). This conception would appear to be a form of, or analogous to, pangenesis. Its acceptance, according to the author, leads logically to a rejection of the concept of "acquired characters," and therefore the troublesome problem of the inheritance (or otherwise) of acquired characters vanishes.

In the discussion of heredity, on pages 175–179, no reference is made to much modern work—Spencer's definition, for example, being quoted, but no reference made to Johannsen's fruitful definition and studies. Johannsen's definition, "the appearance, in successive generations, of the same genotypical constitution of the protoplasm," is suggested by the author's definition: "the like continuity of molecular structure in relation to like outgoing and incoming currents of energy, so long as a body is exposed to the same environment, or to an environment that, within definite limits, fails to alter its average constitution" (p. 179). This definition involves the conception that variation, or disturbance of heredity (p. 178) is "due to changed environal condition," which is the prevailing conception of geneticists as to the cause of variation. On page 187 both heredity and variation are defined in terms of energy.

The theory is maintained (p. 301, and elsewhere) that "the

simpler animals evolved as offshoots from colorless bacterial lines of plant organization. A review of the chapters on animal evolution is not here attempted.

The statement that, when spores mature, "they throw off and break down so much chromatin material" (p. 335), is apt to mislead, if indeed it is not incorrect as referring to the reduction division resulting in the haploid number of chromosomes. The phenomenon of alternation of generations is erroneously limited to "classes of plants higher than the algae" (p. 336), Hoyt's work with *Dictyota*, Harper's with Ascomycetes, and Blackman's with rusts, for example, being overlooked. In the genealogical tree (facing page 356) the now generally recognized group, Cycadofilices, does not appear to be mentioned. The hypothesis that monocotyledons and dicotyledons "all sprang from the great Cordaital stock" (p. 367) is at variance with a mass of evidence and opinion to the effect that the Cordaitales are not in the ancestral line of the angiosperms at all, but only of the gymnosperms.

Pages 598 to 850 of the book are devoted to psychological, archaeological, anthropological, religious, and sociological questions of which only brief mention can be made in a botanical magazine. It is interesting to note that the author postulates morality for the lower animals (p. 660). "Why," he asks, "should the maternal care of the bird . . . be denied the praise of being moral?" That morals "do not originate with man . . . is clearly shown by the many moral acts of bees, beavers, crows, ants, and apes." In Chapter XXVII on "The competitive system amongst the lower animals and with man," the social sympathies of the author seem to be indicated by the dark picture which he draws in the following quotation (p. 764): "The papers, the press, the universities and the churches are nearly all comfortably subsidized in diverse and skillful ways, *in order that* they may support 'the system.'" (The italics are the reviewer's.) This is not the place to discuss such statements, nor perhaps even to refer to them, except that they tend to inspire confidence, or otherwise (according to the reader's own convictions), in the author's judicial attitude of mind, and the logicalness of

his conclusions with reference to purely botanical or zoological questions.

The book is a very thoughtful, sincere, and scholarly treatment of the entire range of evolutionary thought.

C. Stuart Gager

The Swiss League for the Protection of Nature *

A delightful book has been published in England and translated into French, giving descriptions and illustrations of the Alpine Flora of Switzerland. The pictures include snowy peaks and evergreen slopes and are in the daintiest pastel colors, tinged with the blues and purples of the distant views, and in the foreground beautiful with charming groups of alpine flowers, filling the slopes and meadows, clinging in crevices of steep cliffs and rocks and filling the spaces among the stones of the dangerous mountain trails. Here will be found in April, the hepatica and the crocus, or the primroses with the Matterhorn in the distance and the gentians at the foot of the glaciers; in June the anemones and spikes of purple orchids, wild geraniums and globe flowers; the edelweiss and Alpine rose with marguerites, hawkweed, and rampion filling the alpine meadows in July; lovely ravines, fringed with evergreens, with a gorgeous carpet of rainbow colors in the foreground melting off into the pale blues and snowy peaks of the dim distance.

One of the chapters is devoted to the work which has been accomplished in the last twenty years by the Swiss League for the Protection of Nature, of which M. Henry Correvon is the president. The League has been instrumental in setting aside several alpine gardens as sanctuaries for animals and plants and a most interesting account may be found of its experiences with the tourists on whose favor and numbers the prosperity of Switzerland so much depends. Instructions are given to the guides to prevent depredations, but sometimes even they have to look the other way and ignore the peccadilloes of rapacious tourists ("*touris-*

* Sur L'Alpe Fleurie, Promenades Poetiques et Philosophiques dans les Alpes par G. Flemwell, adapté de L'anglais par L. Marret et L. Capitaine, Avec 63 illustrations dont 20 planches hors texte en couleurs. Soc. D'Edition des Sciences Naturelles. L. Marret et Cie, Paris. May, 1914.

tes-arracheur"). By dint of "sweet persuasiveness and moral arguments" they have arrived at a happy solution and are placing signs in all hotels and pensions, exhorting them to spare the fauna and flora. "If some people consider this an attack on their '*liberty*' they are giving a false interpretation to this word; for the society attacks neither a sane joy nor the elements of true liberty; it attacks only license. It fights for law and order; without them there is no true liberty. Without the '*League for the Protection of Nature*' the edelweiss would have disappeared from around Zermatt as the chamois has from around Chamonix. Here is the lesson of history, history that repeats itself, whether in the jungles of Asia or the forests of Africa; and which has necessitated the creation of preserves for the fauna and flora, similar to the 'national parks' of America; the history which has led to the closed season in the shooting of birds and game and necessitated the creation of 'gardens of refuge' for the alpine flora of Switzerland."

E. G. Britton.

PROCEEDINGS OF THE CLUB

February 11, 1919

The first meeting in February was held at the American Museum of Natural History. President Richards called the meeting to order at 8:15 P.M. There were 28 persons present.

No business was transacted.

Dr. E. W. Olive gave an illustrated lecture on "Some Plant disease survey work in New York, Virginia and Pennsylvania." The following abstract was prepared by the speaker:

The speaker spent the summer of 1918 in plant disease survey work, coöperating with the offices of the Plant Disease Survey and Cereal Disease Investigations, of the U. S. Department of Agriculture, and with the state departments of plant pathology of various experiment stations.

The special lines of investigation taken up in New York included studies on the prevalence of fruit diseases, of oat and barley smuts, of onion smut and other truck crop diseases in

the Hudson River Valley. In Virginia, the special problem was the determination of the extent of prevalence of a newly discovered serious disease affecting wheat, causing galls of the wheat grains.

In Pennsylvania, the work was on another recently discovered and very serious disease, the wart-disease of the potato. Although these two diseases seem to be fairly well established in restricted localities, vigorous measures for control and eradication, including strict quarantine against the shipment of these crops outside of the area in which they now prevail, have been instituted by both federal and state agricultural authorities.

Adjournment followed. B. O. DODGE,
Secretary

FEBRUARY 26, 1919

The meeting was held in the Morphological Laboratory of the New York Botanical Garden. Dr. Barnhart called the meeting to order at 3:30 P.M. There were 18 persons present.

Mr. R. W. Woodward, 22 College St., New Haven, Conn., was nominated for membership by Prof. Evans. The treasurer reported upon the probable cost of insuring the stock of the Club's publications.

Prof. Harper called the attention of the club to a set of botanical notes taken by Prof. Newberry while attending the university at Paris a number of years ago. These notes were presented by Prof. Kemp through Prof. Harper to Dr. Britton. Dr. Britton responded briefly in accepting these valuable notes and promised to report upon them further at a later date.

The resignations of Dr. A. H. Chivers and Mrs. W. E. Damon were read and accepted.

Mr. Woodward was then elected to membership.

The scientific program was then in order. Dr. J. K. Small and Dr. N. L. Britton presented a joint paper on "The Prickly Pears of the southeastern United States." This paper was illustrated with photographs and living plants.

After adjournment, Dr. Britton led a party through the gardens, inspecting the Japanese witch-hazels which are in bloom.

Meeting adjourned at 4:45 P.M. B. O. DODGE,
Secretary.

March 11, 1919

The meeting was held at the American Museum of Natural History. President Richards called the meeting to order at 8:15 P.M. There were 57 persons present.

The Club voted to authorize the program committee to call the second meeting of the Club in March on Tuesday evening, March 25, instead of Wednesday.

No other business was transacted.

The program for the evening consisted of a "Symposium and Conference on Botanical Education in the Secondary Schools." The following is a list of the speakers with the title of the paper read by each:

Dr. Otis W. Caldwell, Lincoln High School, Teachers College. "Present Tendencies in High School Botany."

Dr. Francis I. Hughes, Boys' High School, Brooklyn, N. Y. "Botany in City High Schools."

Dr. Cyrus A. King, Erasmus Hall High School, Brooklyn. "Changes in the Teaching of Botany and Biology in the High School."

Dr. Paul B. Mann, The Evander Childs High School. "The Relation of First Year High School Botany to Advanced Work with Reference to Certain Applications and By-products."

Dr. C. Stuart Gager, Director of the Brooklyn Botanic Garden, lead the discussion.

Prof. R. A. Harper, Dr. Caldwell and others also took part in the discussion which followed. Prof. Harper introduced the following resolution which was adopted:

Resolved, that the best interests of biology and of secondary education in New York City would be served by a conference on biology in New York City schools, to be held at the earliest possible date.

The papers read will be published in full in Torreya.

Meeting adjourned.

B. O. Dodge,
Secretary

NEWS ITEMS

The Board of Governors of Harvard University have appointed Mr. E. H. Wilson as assistant director of the Arnold Arboretum. Mr. Wilson returned recently from an extended exploring trip in the Far East.

My mycological friends have heard much of the fungi that have appeared from time to time on my lawn during the past ten years or more. Now it is *Selaginella apus* that takes first place, having occupied during recent years an area of over 500 square yards, forming a soft, delicate, green carpet beneath the grass. It began to spread from the shaded side of the lawn, but did not stop spreading when it reached the sunny open spaces. By the middle of June, the large spore-cases are quite evident under a hand lens at the base of the short, crowded spikes.

—W. A. MURRILL.

A testimonial dinner to Dr. N. L. Britton, director of the New York Botanical Garden, given by the managers at the Metropolitan Club on the evening of May 7, was attended by men of science from all parts of the country. Dr. D. T. MacDougal, director of the Desert Laboratory of the Carnegie Institution of Washington acted as toastmaster, and speeches reviewing the history of the organization of the garden by Dr. Britton twenty-three years ago, and of his widely inclusive and important researches were made by Dr. W. Gilman Thompson, president of the board; Professor R. A. Harper, chairman of the scientific directors; Professor H. F. Osborn, president of the American Museum of Natural History; Provost William H. Carpenter, of Columbia University; Dr. Arthur Hollick, director of the Staten Island Institute of Arts and Sciences, and Professor Geo. T. Moore, director of the Missouri Botanical Garden, at St. Louis. At the conclusion of the ceremonies Mr. Robert DeForest presented Dr. Britton with a loving cup appropriately inscribed on behalf of the board of managers. Congratulatory letters and telegrams from distinguished scientific men were read.

TORREYA

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SCROPHULARIACEAE OF THE LOCAL FLORA. I

By Francis W. Pennell

In commencing the systematic study of a family of plants for North America there is logic in studying first those species which occur in the eastern seaboard of the United States. These were the plants first known in detail, if not necessarily those earliest discovered, on this continent. From Massachusetts to Carolina we are on classic ground, and here the plant-life has been worked over so many times, and each species so often collected, that we may now speak with certainty of nearly all specific identities.

The present study is concerned with but a portion of this territory, the counties included within the local flora range, of the Torrey Botanical Club and of the Philadelphia Botanical Club. These combined include all of Connecticut; New York southeast of Columbia, Greene and Delaware counties inclusive; all of New Jersey; Pennsylvania southeast of Pike, Wayne, Lackawanna, Luzerne, Schuylkill, Lebanon, Dauphin and Lancaster counties inclusive; Newcastle county, Delaware; and Cecil county, Maryland. This area is in main part represented in the Torrey Club collection at the New York Botanical Garden, and the portion within approximately fifty miles of Philadelphia in the remarkably full and valuable collection of the Philadelphia Club at the Academy of Natural Sciences in that city. To both collections I have had free access, and the records below include data from these, the herbaria of Columbia University, the Brooklyn Botanic Garden, the University of Pennsylvania and several other institutions. To the curators of all I am appreciative.

Nearly all the species native or naturalized within the area

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of this study I have myself collected and of each made descriptions of fresh corollas, and noted other features to be gained only in the field. The importance of such work in taxonomic study needs emphasis.

In the present revision keys are given to the genera and species. These are detailed for points of definite contrast. These keys apply only to the species of our flora, and the warning must be made that the generic and tribal contrasts *may* be of little or no assistance beyond this territory. But just such keys as these are of most value to the local worker, and moreover it is by combining such analyses from various regions that we may hope ultimately to build more thorough family keys. An inductive process!

For each genus the type-species is stated. For each native species information of its type is stated, quoted from the original describer. This includes the statement of the particular specimen from which the first description was made and of the place of its collection. The later history of each name is traced. Extra-limital synonyms, even if the names have been current here, are not included except by brief mention. But all names ever proposed based upon plants occurring native in this area are supposed to be included.

With respect to distribution I should like to undertake a study for which the data at hand in our herbaria is not yet sufficient. Moreover my own observations have not as yet been sufficiently prolonged over this area. The counties best represented in herbaria are those of Connecticut; New York, from the Highlands southeastward, including all Long Island; New Jersey, with considerable gaps to the northwest; Pennsylvania southeast of the Blue Ridge; and northern Delaware. Northwest of the Highlands and of the Blue Ridge botanical collections have been few and scattered, the regions best known being the Pocono Plateau of Pennsylvania, and sections of Ulster, Greene and Delaware counties, New York.

Dr. Witmer Stone, in his Plants of southern New Jersey, has traced with a master-hand the distribution of vegetation for the Coastal Plain portion of that state. That regions of as sharp

delimitation occur northward and westward, through the land of hills, of parallel mountain-areas with intervening trough-like valleys, of red soil derived from Triassic rock or of black soil from Ordovician limestone, of various soils derived from the ridges of shale, gneiss and sandstone, appears self-evident. In the northern portion of our territory glaciers, building lake and gravel habitats, have left us a new series of environmental conditions. Mr. Taylor's suggestive Flora does not attempt the detailed analysis of distribution which is demanded. I believe that the careful working-out of the ranges of the species of a few well-selected families of plants will give the knowledge we need for the dividing into phytogeographic areas of this varied inland—knowledge which will be nearly as definite as if multiplied by such a wealth of data as is presented by Dr. Stone. The problem is fascinating and it is with reluctance that I realize that the Scrophulariaceae have not yet been observed over a sufficient area or with sufficient thoroughness to warrant basing upon this study any contribution toward such a survey.

Our present study then attempts but these three goals: to present keys contrasting the genera and species of Scrophulariaceae in our flora, to make certain the nomenclature, and to give preliminary observations of distribution.

A. Corolla with the posterior lobes external in the bud. (Antirrhinoideae.)
- B. Filaments five. Stigma capitate. Capsule septicidal. Sepals five, distinct.
  - C. Corolla rotate, slightly zygomorphic, its lobes much longer than the tube. Filaments all with fertile anthers. Leaves alternate. — I. VERBASCEAE.
    - 1. *Verbascum.*
  - CC. Corolla tubular-campanulate, zygomorphic, its lobes shorter than the tube. Posterior filament without anther, the others didynamous. Leaves opposite. — II. CHELONEAE.
    - Corolla white, lavender or pink, pubescent or puberulent within, its anterior lobes projecting. Sterile filament slender, filiform, white.
      - Corolla membranous, white or lavender, puberulent or somewhat pubescent within over base of anterior lobes. Sterile fila-

ment as long as the others, pubescent on its posterior face. Anther-sacs distinct, glabrous or barbate with short hairs. Sepals lanceolate to ovate, acute to acuminate. Seeds wingless. Inflorescence compound, a raceme of cymosely branching lax flower-clusters. Stem-leaves clasping. 2. *Penstemon.*

Corolla semi-fleshy, white or rose, densely pubescent within over base of anterior lobes. Sterile filament much shorter than others, glabrous. Anther-sacs becoming confluent, densely lanose. Sepals ovate-orbicular, rounded. Seeds winged. Inflorescence simple, a spike-like raceme of single flowers on short several-bracted pedicels. Stem-leaves narrowed at base, short-petioled. 3. *Chelone.*

Corolla red-brown, glabrous within, its antero-lateral lobes vertically projecting, the anterior lobe deflexed. Sterile filament shorter than wide, two-lobed, yellow or red-brown. Inflorescence compound. 4. *Scrophularia.*

BB. Filaments four or two, the posterior one being lost.

C. Acaulescent. Corolla rotate, slightly zygomorphic, white or lavender-tinged. Capsule two-celled at base, septicidal. Stigma capitate. Small herb, spreading by stolons. III. LIMOSELLEAE.

5. *Limosella.*

CC. Caulescent, with leaves mainly cauline. Corolla zygomorphic, the lobes shorter than the tube. Capsule two-celled throughout. Inflorescence simply racemose.

D. Leaves opposite. Corolla without a spur. Stigma of two usually plate-like lobes. Capsule septicidal, or somewhat loculicidal by a simple split down median line of carpel. IV. GRATIOLEAE.

Corolla yellow or white, with throat four-angled, its orifice open; pubescent within at base of posterior lobes. Postero-lateral stamens perfect, antero-lateral reduced to sterile filaments or wanting. Several bractlets at base of the five distinct sepals. Capsule septicidal, or tardily slightly loculicidal. 6. *Gratiola.*

Corolla yellow or lavender-blue, with throat somewhat flattened into a horizontal plane, channeled beneath and arched

posteriorly; pubescent within at base of anterior lobes. No bractlets below calyx.

Perfect stamens four, with slender straight filaments. Corolla 15–30 mm. long, its orifice nearly closed by the raised anterior lip; the posterior lobes rounded and nearly equaling anterior. Style without tubercle-like base. Capsule loculicidal, tardily somewhat septicidal. Sepals united over one-half length. — 7. *Mimulus.*

Perfect stamens two; the antero-lateral filaments fused with corolla ridges, from near apex of which abruptly upcurving. Corolla lavender, 2–10 mm. long, its orifice open; the posterior lobes acute and shorter than the anterior, or else wanting. Style with white persistent tubercle-like base. Capsule septicidal, the thin plate-like septum persisting.

Corolla 6–10 mm. long, with two posterior lobes developed. Postero-lateral stamens perfect, antero-lateral filaments without anthers. Sepals five, united at base. Plants erect or ascending, with leaves 1–3 cm. long. — 8. *Ilysanthes.*

Corolla 2 mm. long, with two posterior lobes lost. Postero-lateral stamens lost, antero-lateral filaments with anthers. Sepals four (the posterior lost), united nearly four fifths their length. Plant repent, with leaves .3–.5 cm. long. — 9. *Hemianthus.*

DD. Leaves alternate. Corolla with a spur at the base of the anterior petal. Stigma capitate. Capsule loculicidal, the septum with adjacent capsule-wall persisting, the remaining wall splitting irregularly. — V. ANTIRRHINEAE.

10. *Linaria.*

AA. Corolla with the anterior lobes external in the bud. (Rhinanthoideae.)

B. Stamens two, the postero-laterals present, the antero-laterals completely lost. Antero-lateral lobes of corolla external in bud. Not parasitic. Sepals four, the posterior lost. Posterior lobes of corolla completely fused. — VI. DIGITALEAE.

Leaves whorled. Corolla white, its lobes shorter than the tube. Capsule acute, longer than broad, not flattened. Plant 10–20 dm. tall. 11. *Veronicastrum.*

Leaves opposite or alternate. Corolla blue, its lobes longer than the tube. Capsule acute to deeply notched, broader than long, flattened. Plants lower. 12. *Veronica.*

BB. Stamens four, didynamous, the antero-laterals usually slightly the longer. Parasitic on roots of other plants.

C. Sepals five, alike, more or less united. Corolla-lobes all somewhat distinct, the posterior spreading or broadly arched; anterior lobe external in bud. Stigma elongated. Capsule loculicidal, splitting through septum. VII. BUCHNEREAE.

Corolla yellow or pink, campanulate, with inflated throat and open orifice. Stamens all perfect, the anthers two-celled, lanose. Two stigmatic lines down each side of style-apex. Filaments and style nearly as long as the tube of the corolla. Capsule exserted from the calyx-tube.

Corolla yellow. Capsule acute to acuminate. Leaves lanceolate to ovate, entire to bipinnatifid, petioled. Stem stout, over 4 dm. tall. Perennials or annuals. 13. *Aureolaria.*

Corolla pink, with red spots within on anterior side. Capsule rounded, with a mucro. Leaves filiform to lanceolate, entire or auriculate-lobed at base, sessile. Stem slender, usually lower. Annuals.

Stem ascending-scabrellous to glabrous. Leaves linear to filiform, entire. Pedicels over 1 mm. long. Calyx-lobes linear to subulate, slightly longer to usually much shorter than the tube. Corolla with two yellow lines within throat anteriorly. Anther-sacs of both pairs of stamens uniform. Capsule globose to globose-ovoid, 3–7 mm. long. Seeds closely reticulate. 14. *Agalinis.*

Stem retrorse-hispid. Leaves lanceolate, usually auriculate-lobed at base. Pedicels less than 1 mm. long. Calyx-lobes ovate, longer than the tube. Corolla without yellow lines within throat anteriorly. Anther-sacs of pos-

terior pair of stamens shorter. Capsule broadly ovate, 10–13 mm. long. Seeds reticulate with raised ridges. 15. *Otophylla.*

Corolla purple-blue, salverform, the tube very narrow and densely pilose, the lobes widely spreading. Postero-lateral stamens becoming rudimentary, the antero-laterals with but one anther-sac. Stigmatic area over entire surface of style apex. Filaments and style less than one half length of corolla-tube. Capsule equaled by and enclosed within calyx-tube. 16. *Buchnera.*

CC. Posterior sepal shorter or wanting. Corolla decidedly two-lipped, the posterior lobes united and arched nearly to apex, the anterior lobes usually shorter; anterior or one antero-lateral lobes external in bud. Stigma short, capitate. VIII. RHINANTHEAE.

Posterior sepal shorter than others. Capsule turgid, septicidal, only tardily slightly loculicidal. Seeds linear, flat, 2 mm. long. 17. *Schwalbea.*

Posterior sepal wanting. Capsule flattened, loculicidal, splitting through septum.

Corolla with posterior lobes projecting, not hooded at apex, the anterior lobes very short, thickened, deep-green. Seeds many, reticulate. Bracts foliaceous, distally scarlet. 18. *Castilleja.*

Corolla with posterior lobes arched, hooded at apex, the anterior lobes membranous, flat, colored. Seeds few, not reticulate. Bracts not colored.

Corolla yellow or pink throughout, the anterior lip not raised into a palate. Seeds more than two. Sepals of each side united nearly or quite to apex. Leaves crenate-serrate to bipinnatifid-lobed.

Corolla 12 mm. long. Anthers lanose. Capsule circular, equally two-celled, splitting on both posterior and anterior sides. Seeds 5 mm. long, circular, flat, broadly winged. Sepals as long as the capsule, on each side united nearly to apex. Leaves crenate-serrate. Annual. 19. *Rhinanthus.*

Corolla 15–20 mm. long. Anthers glabrous. Capsule ensiform, un-

equally two-celled, splitting only on posterior side. Seeds 1 mm. long, oblong, cylindric, not winged. Sepals less than one half length of capsule, on each side united to apex. Leaves bipinnatifid-lobed. Perennials. 20. *Pedicularis.*

Corolla white, the anterior lip raised into a yellow densely pubescent palate. Seeds maturing two to a capsule. Sepals united at base only, the two postero-laterals longer. Leaves lanceolate, entire or setaceous-toothed near base. 21. *Melampyrum.*

1. VERBASCUM L., Sp. Pl. 177. 1753

Type species, *V. Thapsus* L. of Europe.

Leaves glabrous. Stem above and calyx with simple glandular hairs. Corolla yellow or white. Filaments all densely lanose with knobbed purple hairs. Pedicels 10–15 mm. long. Capsule subglobose, glandular-puberulent. Seeds .8–.9 mm. long, dark-gray. 1. *V. Blattaria.*

Leaves, stem and calyx more or less pubescent with stellately-branched non-glandular hairs. Corollas always yellow. Filaments: three posterior lanose, two anterior sparingly lanose to glabrous, with filiform yellow hairs. Pedicels less than 10 mm. long. Capsules ovoid or oblong, stellate-pubescent. Seeds .4–.7 mm. long, brownish-gray.

Leaves dark and becoming glabrate above, whitened beneath, sessile or the lower petiolate, not decurrent. Pedicels reaching 10 mm. long, clustered three to twelve in an axil. Sepals linear, 2–2.5 mm. long, much shorter than the mature capsule. Corolla 18 mm. wide. Capsule 4 mm. long. Seeds 6–7 mm. long. 2. *V. Lychnitis.*

Leaves dull- or yellowish-green and permanently pubescent above, scarcely paler beneath, sessile, more or less decurrent. Pedicels reaching 5 mm. long, one to five in an axil. Sepals ovate, 6–8 mm. long, slightly shorter than to equaling the mature capsule. Corolla 20–35 mm. wide. Capsule 6–8 mm. long. Seeds .4–.5 mm. long.

Stem-leaves broadly ovate, strongly crenate, dull-green, moderately pubescent. Pedicels reaching 5 mm. long, three to five to an axil. Inflorescence interrupted. Corolla 30–35 mm. wide. 3. *V. phlomoides.*

Stem-leaves lanceolate, finely crenate, yellowish-green, very densely pubescent. Inflorescence crowded. Pedicels very short to none, one to an axil. Corolla 20–22 mm. wide. 4. *V. Thapsus.*

1. Verbascum blattaria L.

Flowering from mid-June to mid-August, fruiting from early July on.

Loam soil, cultivated fields, common throughout the area above the Fall-line, rarely recorded from the Coastal Plain. Naturalized from Eurasia.

2. Verbascum lychnitis L.

Flowering from late June to August, fruiting from August on.

Loam soil, roadsides, local in the area above the Fall-line, especially near the cities. Naturalized from Eurasia.

3. Verbascum phlomoides L.

Collected in flower in July and August.

Probably sandy soil, cultivated fields; rare. Garden City, L. I.; Lindenwold, N. J. Adventitive from Eurasia.

4. Verbascum thapsus L.

Flowering from mid-July to late August, fruiting in August and September.

Mainly in loam soil, fields and roadsides; common throughout, mainly above the Fall-line. Naturalized from Eurasia.

2. Penstemon [Mitchell Schmidel, Icones Plantarum 2. 1762

Type species, *Chelone Penstemon* L., "Habitat in Virginia."

Corolla funnelform; throat tubular; lobes widely spreading; puberulent within. Leaves entire or the upper slightly serrulate, glabrous, under a lens evidently puncticulate. Seeds strongly ridge-angled. 1. *P. tubiflorus.*

Corolla with throat tubular near base, then abruptly inflated; pubescent within at base of anterior lobes. Leaves more or less denticulate, not evidently puncticulate under a lens. Seeds not strongly ridge-angled.

Corolla with throat inflated, its mouth open, not closed by the anterior lip. Sterile filament slightly to moderately densely bearded. Calyx-lobes ovate-lanceolate to lanceolate. Plants taller, glabrous to puberulent.

Corolla white, rather strongly inflated. Anther-sacs usually barbate. Stem glabrous or nearly so. — 2. *P. Digitalis.*

Corolla light violet-purple, moderately inflated. Anther-sacs glabrous. Stem puberulent. — 3. *P. Pentstemon.*

Corolla with throat scarcely inflated, its mouth closed by the anterior lip, which closes as a convex arc. Sterile filament very densely bearded. Calyx-lobes ovate. Plants lower, the stem pubescent or hirsute.

Corolla 15–20 mm. long, white with violet lines. Anther-sacs oval. Calyx-lobes obtuse to short-acuminate. Stem and leaves soft-canescent. Leaves lanceolate. — 4. *P. pallidus.*

Corolla 23–28 mm. long, lavender-purple, unlined. Anther-sacs triangular-orbicular. Calyx-lobes acuminate to caudate. Stem and frequently midrib of leaves beneath more or less lanose-hirsute. Leaves lanceolate-attenuate. — 5. *P. hirsutus.*

1. Penstemon tubiflorus Nutt.

Flowering in June.

Fields, seen only from Spring Valley, Rockland Co., N. Y. Introduced from the southwestern Mississippi Valley.

2. Penstemon digitalis Nutt.

Flowering from mid-June to early July, fruiting in late August and September.

Fields and meadows, frequent above Fall-line. Introduced from the southwestern Mississippi Valley.

3. Penstemon pentstemon (L.) MacMillan.

Flowering in June and July.

Fields and meadows, seen only from Rockland Co., New York and Bergen and Gloucester counties, New Jersey. Introduced from the South Atlantic states.

4. Penstemon pallidus Small, Fl. S. E. Un. St. 1060, 1337. 1903.

"Type, Bedford, N. Y., *Britton*, June, 1900, in Herb. N. Y. B. G." Type seen; also the plant re-collected and studied at the type-station.

Flowering from mid-May to late June.

Sandy or barren soil, occasional, mostly above the Fall-Line. Certainly introduced from the central Mississippi Valley.

5. Penstemon hirsutus (L.) Willd.

Chelone hirsuta L., Sp. Pl. 611. 1753. "Habitat in Vir-

ginia." Based upon Clayton n. 39 in the Gronovian Herbarium. The Linnean characterization certainly denotes the plant here considered.

Penstemon hirsutus (L.) Willd., Sp. Pl. 3: 227. 1800.

Flowering from late May to early July, fruiting from July on.

Dry fields, usually sandy, in potassic soil, occasional or local through the area above the Fall-line. Ranges from southern Vermont and southern Ontario to upland Virginia, Kentucky and southern Michigan.*

3. Chelone L., Sp. Pl. 611. 1753

Type species, *C. glabra* L.

1. Chelone glabra L., Sp. Pl. 611. 1753. "Habitat in Virginia, Canada." Based upon a plant grown in the Clifford garden in Holland.

Chlonanthes tomentosa Raf., New Fl. Am. 2: 20. 1837. "In the mts. of Virginia." Leaves tomentose or pubescent beneath; a condition of more frequent occurrence southward, specimens noted from Monmouth, Burlington and Camden counties, New Jersey, and frequently through southeastern Pennsylvania. Here treated as a form, **tomentosa** (Raf.) Pennell, forma nova.

Flowering from early August to early October, fruiting from mid-September on.

Moist loam to sandy woodland, in potassic soil, frequent to common throughout above the Fall-line; frequent or occasional through the Coastal Plain, outside of the Pine Barrens. The leaves tend to be narrower in the Coastal Plain. Ranges from Newfoundland to Manitoba, northern Florida and Kansas.

4. Scrophularia L., Sp. Pl. 619. 1753

Type species, *S. nodosa* L., "Habitat in Europae succulentes."

Petioles stouter, evidently wing-margined. Leaves cuneate to truncate at base, coarsely serrate to dentate. Inflorescence narrowly elongate, 4–8 cm. wide, its branches rela-

* Paulownia tomentosa (Thunb.) Baill.

A tree with lavender flowers, is an occasional escape from cultivation to roadsides, railroad-banks and thickets. Adventive from eastern Asia.

tively stout. Calyx-lobes triangular-obtuse. Corolla 8–12 mm. long. Fertile filaments more evidently pulverulent. Sterile filament 1.8 mm. wide, yellow. Capsule pyramidal-acuminate, 5–10 mm. long. Seeds .8–1 mm. long, reticulate with transverse areas. Flowering in early summer. 1. *S. leporella.*

Petioles slender, scarcely margined. Leaves narrowed to cordate at base, more finely crenate-serrate. Inflorescence pyramidal, 5–18 cm. wide, its branches slender. Calyx-lobes more broadly rounded. Corolla 6–8 mm. long. Fertile filaments very finely pulverulent. Sterile filament 1 mm. wide, purple-brown. Capsule ovoid, acute, 4–7 mm. long. Seeds .5–.8 mm. long, plump, reticulate with more nearly hexagonal areas. Flowering in late summer. 2. *S. marilandica.*

Scrophularia leporella Bickn. in Bull. Torr. Bot. Club 23: 317. 1896. "Common near New York City. . . . I have met with it within eight miles of the Connecticut line and in the Pocono region of eastern Pennsylvania." Specimen from Bronxville, Westchester Co., New York, collected by E. P. Bicknell June 15, 1895, seen in herbarium Columbia University at The New York Botanical Garden.

Only inconstantly to be distinguished from *S. occidentalis* (Rydb.) Bicknell of the Rocky Mountain and High Plains states by its leaves being less coarsely and more evenly serrate (in *occidentalis* frequently coarsely toothed at base), and the branches of the inflorescence being usually less stout and less densely glandular. Probably better considered as a geographic variety.

Flowering from mid-May to mid-July, fruiting from late June to late August.

Meadows and thickets, loam, in potassic soil, frequent throughout above the Fall-line; less frequent or occasional on Long Island, and in the Middle and Cape May district of New Jersey. Ranges from Quebec to Connecticut and Virginia, westward to North Dakota and Nebraska where it appears to pass into *S. occidentalis.*

2. Scrophularia marilandica L., Sp. Pl. 619. 1753. "Habitat in Virginia." Linné had no specimen in his herbarium in 1753, but his description is copied from Hortus Upsalensis 177. 1748. From the diagnosis there given, especially the mention of leaves cordate serrate, and of

petiole but very slightly decurrent, the plant of the Upsala Garden would appear to have been the species now considered.

Scrophularia lanceolata Pursh, Fl. Am. Sept. 2: 419. 1814. "In wet meadows and woods: Pennsylvania." Description apparently of this. The type of this should be verified, but the description of the petioles as not ciliate, and the lateness of the time of flowering would indicate that Pursh described as new the original *marilandica*.

Scrophularia nodosa marilandica (L.) A. Gray, Syn. Fl. N. Am. 2. I: 258. 1878.

Scrophularia nodosa lanceolata (Pursh) M. E. Jones, Contrib. West. Bot. 12: 67. 1908.

Flowering from late July to late September, fruiting from early August into October.

Open woodland, loam, in potassic soil, frequent or northward rare through the area above the Fall-line; occasional in western Long Island, and near the Delaware River in the Middle District of New Jersey. Ranges from Massachusetts and southern Ontario to Georgia, Arkansas and Nebraska.

(To be continued.)

TUMION TAXIFOLIUM IN GEORGIA

By Roland M. Harper

The Florida "savin" or "stinking cedar," *Tumion taxifolium* (Arn.) Greene (*Torreya taxifolia* Arn.) an evergreen tree closely related to the yews, ever since its discovery by H. B. Croom near Aspalaga in western Middle Florida about 85 years ago, has been celebrated in botanical circles on account of its very restricted distribution and its belonging to a genus which was widespread in pre-historic times but is now practically confined to Florida, California, China and Japan.*

* Existing knowledge about this tree is pretty well summed up in the following works: Asa Gray, Am. Agriculturist **34**: 266–267. 1875 (reprinted with some alterations in "Scientific Papers of Asa Gray," **1**: 188–196. 1889); A. H. Curtiss, Tenth Census U. S. **9**: 521. 1884; A. W. Chapman, Bot. Gaz. **10**: 251–254. 1885; G. V. Nash, Bull. Torrey Club **23**: 96. 1896; H. C. Cowles, Rep. 8th

For many years previous to the time herein noted it was known only on the east side of the Apalachicola River in Gadsden and Liberty Counties, Florida, from Chattahoochee to Alum Bluff, a distance of about twenty miles. (There have been unverified rumors of its occurrence away from the river in Jackson and Wakulla Counties.) Its usual habitat is shaded bluffs and ravines, in the neighborhood of outcrops of the Chattahoochee formation (an argillaceous limestone), and most of it is close to the river, though some specimens have been seen a mile or two up the valleys of tributary creeks. The locality oftenest visited is near River Junction, a small place near the northern edge of the state, which has had one railroad for over forty years, and four for the last twelve years. On account of the restricted range of the tree, some writers have imagined it to be on the verge of extinction; but it is quite abundant yet, especially in the vicinity of Aspalaga, where it was first discovered, and it does not seem to be in any immediate danger. (Its near relative *Taxus Floridana*, curiously enough, grows in the same region and is much rarer, but somehow it has attracted very little attention among botanists. The *Tumion* may have achieved notoriety mainly through being named first for Dr. Torrey, and having been made the object of a pilgrimage by Dr. Gray in the days when it bore the name of *Torreya*.)

In August, 1903, while botanizing in extreme southwestern Georgia, I remembered that this famous tree grew within a mile or two of the Georgia line, and thought it would be a simple matter to find it on the Georgia side, a matter which no one apparently had made any special effort to do. So I went one day to River Junction and had a native guide me to the nearest colony of the tree, and after taking a good look at it I spent nearly two days walking up along and near the river to Bainbridge; but I saw no *Tumion* outside of the colony first shown to me. In the light of subsequent developments it is now evident that after crossing the state line I stayed in the alluvial bottoms of the river too long, and did not turn out into the bluffs until I

Int. Geog. Cong. 599. 1905; Sellards & Gunter, Ann. Rep. Fla. Geol. Surv. **2**: 262. 1910; R. M. Harper, Bull. Torrey Club **32**: 149. 1905; Torreya **11**: 225–226. 1911; Ann. Rep. Fla. Geol. Surv. **6**: 212, 215, 354, 411, 412. 1914.

had passed beyond the northern limit of the tree, perhaps a mile or two from the line. No detailed maps of the neighborhood were available then (or now), which made it difficult to get my bearings.

The imaginary line which forms the greater part of the boundary between Georgia and Florida is supposed to take the most direct course from the confluence of the Flint and Chattahoochee Rivers to the head of the St. Mary's, bearing about S. 87° E.; but surveying a straight line to connect two points over 150 miles apart involves serious engineering difficulties, and three lines were run at different times in the last century, varying a mile or so near the middle. The northernmost was finally selected as the boundary, but at the point under consideration, about a mile from the western extremity of the line, the possible error is only a few yards.

While working in Florida between 1908 and 1915 I visited River Junction a few times, and saw the *Tumion* near there, but made no further effort to determine its northern limit. But on August 16, 1918, while on business for the U. S. Bureau of Plant Industry, I had a few hours between trains there, during which I explored the neighborhood a little, not having been there at that season since 1903.

The northern boundary of the grounds of the Florida Insane Hospital at Chattahoochee, about a mile and a half north of River Junction, is marked by a stout wire fence which is said to be exactly on the state line, and terminates on the west about a mile from the river, at a road running approximately north and south. Having followed the boundary fence until I came to the road, I turned north into Georgia, and about a hundred yards farther on, seeing some interesting-looking woods at the left of the road, I entered them. A few steps down the slope, a ravine appeared at my right (*i.e.*, north), and in that I found several trees of *Tumion taxifolium*, some about a foot in diameter and forty feet tall, together with its common associates, *Magnolia grandiflora*, *Fagus*, *Liriodendron*, *Ilex opaca*, *Acer Floridanum*, *Pinus glabra*, *Quercus alba*, *Pinus Taeda*, *Cercis*, *Ostrya* and *Liquidambar* (to mention trees only).

The mere extension of the known range of this tree northward about a mile would hardly be worth mentioning, but for the fact that the species has been written about so much, and the new locality being in a different state will necessitate a modification of the statements about it in books about North American trees, Georgia plants, etc. The present indications are that it does not extend into Georgia more than a mile. A few specimens were collected and afterwards distributed to the leading American herbaria, for the benefit of persons who may attach more importance to the possibility of identifying the species (even such an unmistakable one as this) wrongly than to that of making a false or erroneous or inadequate statement on the label about the locality. (In other words, there are probably some taxonomists who if no specimens existed to back it would not take cognizance of this report of a new locality, but seeing a specimen labeled Georgia in large type would not worry about the possibility of a slight error in latitude.)

University, Ala.

PROCEEDINGS OF THE CLUB

March 25, 1919

The second meeting for March was a special evening meeting held in the Laboratory Building of the Brooklyn Botanic Garden, Tuesday, March 25, under the joint auspices of the Club and Garden. Vice-president Gager called the meeting to order at 8:25 P.M. There were 53 persons present. No business was transacted.

The program consisted of a series of motion pictures on plant life shown by courtesy of the U. S. Department of Agriculture, whose representative, Dr. R. B. Harvey, of the Bureau of Plant Industry, Plant Physiology and Fermentation Investigations, gave the lecture.

The first film showed a series of views of various operations performed in connection with strawberry culture in Kentucky, cultivating, hoeing, inspecting, picking, sorting, packing, loading, refrigerating and consuming were among the operations depicted.

The second picture showed the movement of the protoplasm in the cells of a leaf of *Elodea*. Another view showed the flow of protoplasm in the hypha of the fungus *Pythium*.

Dr. Harvey then spoke of the disease of potatoes known as leak caused by the parasite *Pythium* which is doing so much damage in the potato region of San Juaquin Valley in California. The speaker explained in considerable detail how the pictures were obtained. The pictures showed the behavior of a hypha during the act of penetrating the wall of a cell of the potato tuber.

Informal discussion followed the lecture. Meeting adjourned.

B. O. Dodge,
Secretary

April 8, 1919

The first meeting in April was held at the American Museum of Natural History. President Richards called the meeting to order at 8:15 P.M. There were 25 persons present.

As there was no business to be transacted, the reading of minutes was postponed.

Dr. J. N. Rose, National Museum, Washington, D. C., gave an illustrated lecture on Botanical Explorations in Equador. The following abstract was prepared by the speaker:

"Dr. Rose gave an account of his recent botanical trip to Ecuador where he went in 1918 to inaugurate the coöperative investigation of the flora of South America which has recently been organized by the United States National Museum, The New York Botanical Garden and the Gray Herbarium of Harvard University.

"He described in some detail the flora which is seen in going from Guayaquil on the coast to the high Andean Valley. He also described his trip to southern Ecuador, where he traveled over the old route followed by Humboldt and Bonpland more than a hundred years before. On this expedition he re-collected many of the species obtained previously by Humboldt, collecting some of them from the exact locality from which they had been reported by him.

"His chief work was done about the little town of Huigra,

situated at an altitude of 4,000 feet, which he found a most convenient base from which to make excursions.

"Dr. Rose also told of his trip across southern Ecuador from Loja to the coast when he collected a number of very interesting cactus types of which quite a number were new to science.

"Among the plants which were especially interesting were a species of *Juglans* similar to the black walnut of the United States, several mountain species of *Carica*, a species of *Zamia*, various *Cinchona* species, four or five species of *Brugmansia*, some of which deserve cultivation as ornamentals, a striking species of *Gunnera*, several species of *Tropaeolum* and various species of *Rubus* and *Berberis*. He collected about two thousand numbers of plants."

Adjournment followed.

B. O. Dodge,
Secretary

NEWS ITEMS

Oliver A. Farwell, instructor in botany in the Detroit College of Pharmacy has been appointed Professor of botany and phamacognosy vice Walter H. Blome, M.S., Ph.C., professor of materia medica and pharmacognosy, resigned.

Dr. B. M. Duggar, of the Missouri Botanical Garden, is spending the summer at the Coastal Laboratory of the Carnegie Institution, Carmel, Cal., engaged in a continuation of his work on hydrogen ion concentration in plant cultures.

TORREYA

Vol. 19 — July, 1919 — No. 7

THE SEDGES OF THE LAKE GEORGE FLORA

By Stewart H. Burnham

The collection and study of the Cyperaceae was begun in 1891. It was Dr. Alvan Wentworth Chapman who awakened my interest in carices: and who named and verified my earlier collections, March 11, 1892 and January 18, 1893. In Gray Memorial Botanical Chapter of the Agassiz Association Bull. *1*: 7–8. 1893, there is a list of sixty-five "Carices" of Vaughns and vicinity, compiled March 29, 1893. In this list *Carex aperta*, *C. Oederi* and *C. squarrosa* should be eliminated.

The region covered by the Flora includes the counties of Washington, Warren and Saratoga. There are a few additional records from Mt. Defiance, Ticonderoga, Essex County. Dr. E. A. Burt collected carices about East Galway, Saratoga County, about 1880: these are preserved in his herbarium and have been verified by Dr. Ezra Brainerd. Mr. Frank Dobbin has collected many sedges near Shushan and Cambridge in southern Washington county, specially from 1903 to 1911. Dr. Chas. H. Hall collected sedges in 1880 at Lake George, probably near Bolton: these are preserved in the Herbarium of the Brooklyn Botanic Garden. Dr. E. C. Howe collected about Fort Edward and in Hartford, from 1863 to 1866: and some of these specimens are presumably preserved in the N. Y. State Herbarium and in the Herbarium of the N. Y. Botanical Garden. Dr. Smith Ely Jelliffe collected sedges about Huletts Landing, Lake George, in 1887–1888: these may be found in his herbarium in New York City. Dr. Chas. H. Peck also collected many sedges in the territory; which are preserved in the N. Y. State Herbarium.

There are many sedges, particularly carices, that have not

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been recorded for the Lake George region that undoubtedly occur there. A careful survey of the higher mountains in the vicinity of North Creek, Warren county would probably add some additional species to the following list.

List of species

Cyperus diandrus Torr. Wet places and about ponds; not common. Providence (E. A. Burt); Mud Pond near Pattens Mills; Vaughns; Shushan; Waterford.

Cyperus rivularis Kunth. Habitat similar to the preceding species; common. Presumably the plant reported as "*Cyperus Nuttallii* Torr. Luzerne, 1867: G. W. C(linton)" in N. Y. State Cab. Rep. 20: 408. 1867 belongs here.

Cyperus inflexus Muhl. Banks of rivers, vicinity of Cambridge, N. Y. (Stevenson). Torrey, Flora of the Northern and Middle Sections of the United States, vol. 1: 59. 1824. Furnace creek, South Bay, Aug. 20, 1908.

Cyperus Houghtoni Torr. Fort Edward (E. C. Howe); Hague, 1878 (W. H. Leggett in Columbia Herbarium); sandy fields near Bacon Pond; also near the Five Combines, east of Hudson Falls.

Cyperus dentatus Torr. Sandy shores. Trout Pond (C. H. Hall); Assembly Point; Bond Pond, Warrensburg; Mud Pond; along Hudson River west of Glens Falls.

Cyperus esculentus L. Cultivated soil. Shushan (F. Dobbin); east of Fort Ann; Kingsbury St.; Moss St.; Hudson Falls; Coveville; Waterford; Poebles Island, mouth of Mohawk River.

Cyperus strigosus L. Sandy fields and along streams; abundant.

Cyperus filiculmis Vahl. Sandy fields, sometimes in rocky places; not uncommon. The plants are referable to var. *macilentus* Fernald.

Eleocharis olivacea Torr. Mud Pond near Pattens Mills, growing in miry places. Determined by Dr. C. H. Peck.

Eleocharis diandra Wright. Hudson River at Bakers Falls, Sept. 13, 1899. Determined by Dr. Peck.

Eleocharis obtusa (Willd.) Schultes. Muddy places, along streams and about ponds; common.

Eleocharis palustris (L.) R. & S. Wet places and shallow water; frequent. The var. *glaucescens* (Willd.) A. Gray is found at Providence (Burt); wet clay bank north of Hudson Falls railroad station. Along Hudson River west of Glens Falls; and Copeland Pond. Determined by Dr. Peck. The form with stout culms, var. *vigens* Bailey, is found at Bacon and Mud Ponds.

Eleocharis acicularis (L.) R. & S. Stream and pond bottoms, where the water has subsided; common.

Eleocharis tenuis (Willd.) Schultes. Stream banks, bogs and about ponds; abundant.

Eleocharis acuminata (Muhl.) Nees. Shushan (Dobbin).

Eleocharis intermedia (Muhl.) Schultes. Copeland Pond, determined by Dr. H. D. House; Shushan, down the Battenkill River.

Stenophyllus capillaris (L.) Britton. Sandy and gravelly soil. Day (Peck); slopes of Mt. Defiance (Peck); Fort Edward (Howe); Providence (Burt); southwestern W. Fort Ann; north of Glens Falls; north of Hudson Falls; Moreau; northwest of Waterford; north of Cambridge.

Fimbristylis autumnalis (L.) R. & S. Mud Pond; moist sandy roadside north of Hudson Falls; along Hudson River west of Glens Falls.

Eriophorum alpinum L. Sphagnum marshes. East Lake George, at Brayton; marsh near road, north of Glen Lake; Rich's swamp, southwest of Shushan.

Eriophorum callithrix Cham. Sphagnum marshes. North part of Salem (Dobbin); E. Lake George; south of Glen Lake; Inman Pond. (*E. vaginatum* of Am. auth.)

Eriophorum gracile Koch. Lake George (Hall); Shushan, "one or two mucky situations" (Dobbin); sphagnum marsh, E. Lake George.

Eriophorum viridicarinatum (Engelm.) Fernald. Sphagnum marshes and low swales; frequent. (*E. polystachyon* of most Am. auth.)

Eriophorum virginicum L. Sphagnum marshes and low swales; frequent. The var. *album* A. Gray often occurs.

Scirpus subterminalis Torr. Aquatic. Roadside pond, Clemons to Black Mt.; Mud Pond; Glen Lake.

Scirpus debilis Pursh. "Luzerne, 1866: G. W. C(linton)" in N. Y. State Cab. Rep. 20: 409. 1867. Copeland Pond; Hudson River at Bakers Falls; Shushan, down the Battenkill River.

Scirpus Smithii A. Gray. Mud Pond near Pattens Mills. Determined by Dr. Peck.

Scirpus americanus Pers. Near the mouth of Pike brook, South Bay; Waterford; Poebles Island.

Scirpus Torreyi Olney. Dresden (Peck).

Scirpus validus Vahl. Streams and ponds in shallow water; common.

Scirpus occidentalis (S. Wats.) Chase. Clarks Pond west of Shushan.

Scirpus fluviatilis (Torr.) A. Gray. South Bay, forming swales along Dresden trestle north of Whitehall.

Scirpus sylvaticus L. Low grounds. Fort Ann to Flat Rock; northwest Hartford; Moreau, opposite Fort Edward; along the trolley, Wilton to Ballston Lake; along the Battenkill River south of Shushan.

Scirpus atrovirens Muhl. Low grounds and moist grassy places; abundant. The heads are often proliferous late in the season. The form *synchocephalus* (Cowles) S. F. Blake occurs in Freeman's pasture, Kingsbury St. to Fort Ann.

Scirpus microcarpus Presl. Low grounds and swamps; frequent. "Fine specimens were obtained near Wilton, Saratoga county" (Peck). N. Y. State Mus. Rep. 45: 30. 1893 Bot. ed. (*S. rubrotinctus* Fernald.)

Scirpus polyphyllus Vahl. Moist woods. Gansevoort (Peck). N. Y. State Mus. Rep. 41: 82. 1888. Mt. Hope road north of Lake Pond; road to Three Ponds.

Scirpus Peckii Britton. Shushan (Dobbin).

Scirpus lineatus Mx. Wet meadows. "Low moist ground near Middle Grove" (Peck). N. Y. State Mus. Rep. 47: 30. 1894 Bot. ed. Northwest of Stone schoolhouse, W. Fort Ann; Vaughns; near Kingsbury St.; Rosecrans swamp north

of Glens Falls; along the D. & H. railroad, Ballston to Mechanicsville.

Scirpus cyperinus (L.) Kunth. Low grounds, along creeks and about ponds; abundant. The var. *condensatus* Fernald is occasionally met with.

Scirpus pedicellatus Fernald. Lake George (Hall); "Lake Champlain, along railroad between Whitehall and Fort Ann and between Schuylerville and Bemus Heights" (Peck). N. Y. State Mus. Rep. 54: 144. 1901. Fort Ann; W. Fort Ann.

Scirpus atrocinctus Fernald. Whitehall (Peck); W. Fort Ann, about ponds; swamp woods, Fort Edward reservoir; Anaquassacook meadows, south of Shushan. This species matures its fruit earlier than the two preceding species.

Dulichium arundinaceum (L.) Britton. Borders of sphagnum marshes, margins of ponds and wet woods; common.

Rynchospora alba (L.) Vahl. Sphagnum marshes and borders of ponds. Inman Pond; Podunk Pond; Copeland Pond; E. Lake George; Glen Lake; Rosecrans swamp; Fort Edward reservoir; Rich's swamp near Shushan.

Rynchospora capillacea Torr. Along Hudson River west of Glens Falls, Sept. 12, 1900.

Rynchospora glomerata (L.) Vahl. East of South Glens Falls; roadside northwest of Hadlock Pond; Copeland Pond.

Rynchospora fusca (L.) R. & S. Sphagnous border of Dolph Pond, west of Comstocks, June 13, 1900 (young). The station is probably destroyed.

Mariscus mariscoides (Muhl.) Kuntze. Borders of ponds. Lake George (Hall); Inman Pond; Podunk Pond; Copeland Pond; Mud Pond. It has not been seen at the last two stations for several years. (*Cladium mariscoides* (Muhl.) Torr.)

Carex chordorrhiza Ehrh. Peat bog, Moreau (Howe); E. Lake George marsh at Brayton.

Carex retroflexa Muhl. Peaked Mt.; copse west of Vaughns.

Carex rosea Schk. Woods and copses; common. The form known as var. *staminata* Pk. occurs at Vaughns and vicinity: and the var. *radiata* Dewey, in northern Washington county. Both of these varieties, determined by Dr. Peck.

Carex convoluta Mackenzie. Silver Bay, Lake George, June 1901 (J. F. Kemp in Herbarium of N. Y. Botanical Garden). Recorded in Bull. Torr. Bot. Club **43**: 429. Aug. 1915. (*C. rosea pusilla* Pk.)

Carex cephalophora Muhl. Dry woods; frequent.

Carex cephaloidea Dewey. Southern base of Woodruff's hill, 1½ miles west of Fort Ann, June 1892, 1893 (not seen, June, 1914); woods southwest of Ray Farm, west of Fort Ann, June, 1904.

Carex sparganioides Muhl. Copses and rich shaded soil; common. The culms are very weak at the time of the falling of the perigynia.

Carex vulpinoidea Mx. Low grounds; common.

Carex xanthocarpa Bicknell. Dry fields and pastures. Gansevoort and Middle Grove (Peck); southern W. Fort Ann; Vaughns. The var. *annectens* Bicknell is found at Vaughns. Determined by Dr. Peck.

Carex prairea Dewey. East Lake George marsh; Copeland Pond; Rich's swamp near Shushan. Specimens found in low grounds, sometimes forming tussocks in shallow water at Huletts Landing (Jelliffe); Warrensburg (Peck); Fort Edward (Howe); southern W. Fort Ann, formerly known as *Carex teretiuscula* Gooden., have not been verified. Undoubtedly *Carex diandra* Schrank occurs: but probably the majority of our plants are referable to *Carex prairea.*

Carex stipita Muhl. Swamps and along streams; common. The form known as var. *crassicurta* Pk. is found in southern W. Fort Ann; the var. *subsecuta* Pk. occurs in Devine's woods at Vaughns and at Tripoli. Both of these varieties were determined by Dr. Peck.

Carex disperma Dewey. Sphagnum bogs and mossy woods; frequent. (*C. tenella* Schk.)

Carex trisperma Dewey. Sphagnum marshes and cool mossy woods; frequent. The var. *Billingsii* Knight is found in the swamp north of Glen Lake.

Carex tenuiflora Wahl. Sphagnum marsh, Hartford (Howe); E. Lake George marsh at Brayton, June, 1897, and 1900. Recorded in N. Y. State Mus. Rep. 54: 161. 1901.

Carex canescens L. Wet bogs, sphagnum marshes and shaded places, rarely in dry woods; frequent. The var. *disjuncta* Fernald is the common form.

Carex brunnescens (Pers.) Poir. Wet woods, rarely on rocky, Southern slopes of Peaked Mt. in loose tufts on rocks; Mott's and Dailey's woods, north of Hudson Falls; Rich's swamp near Shushan. The var. *gracilior* Britton has been found at Inman Pond; bog west of Stone schoolhouse, one mile north of Tripoli; Devine's woods, Vaughns.

Carex Deweyana Schwein. Copses and rocky woods; common.

Carex bromoides Schk. Wet woods and along streams, forming tussocks; common.

Carex exilis Dewey. Sphagnum marsh at E. Lake George, Brayton; marsh near the road, north of Glen Lake.

Carex Leersii Willd. Low grounds and sphagnum bogs; abundant. The var. **angustata** (Carey) was found at Dolph Pond, June 19, 1900; and var. **cephalantha** (Bailey) in Mott's woods near Hudson Falls, June 28, 1897. Both these varieties were determined by Dr. Peck. (*Carex sterilis* of Am. auth; *C. stellulata* Gooden.)

Carex Crawfordii Fernald. Dry and open places. Southern W. Fort Ann; rocks at head of Dunham's Bay, Lake George.

Carex scoparia Schk. Swales and low meadows; common.

Carex tribuloides Wahl. Marshy places. Dunham's Bay; Vaughns; Powers Ferry; Fly Kill south of Shushan. The forma *glomerata* Olney from Fort Edward (Howe): and the var. *turbata* Bailey from Middle Grove (Peck), are preserved in the N. Y. State Herbarium.

Carex cristatella Britton. Grassy places near streams and ponds; common.

Carex projecta Mackenzie. Copeland Pond; northeast of Tripoli; Devine's woods; Dailey's woods. (*C. tribuloides moniliformis* Britton.)

Carex straminea Willd. Dry woods and fields; abundant.

Carex normalis Mackenzie. Low woods, southern W. Fort Ann; Mott's woods. The var. **perlonga** (Fernald) is found on Haynes hill, Vaughns. (*C. mirabilis* Dewey.)

Carex festucacea Schk. Sandy plains northeast of Hudson Falls; and gravelly hill north of Copeland Pond. Determined by Dr. House. The var. *brevior* (Dewey) Fernald has been found at Warrensburg (Peck); East Galway (Burt); South Bay; rocks east of Fort Ann; Peaked Mt.; Peaked Rock, near Shushan.

Carex Bicknellii Britton. Dry sandy soil, East Galway (Burt) and Middle Grove (Peck). N. Y. State Mus. Rep. 48: 45. 1896 Bot. ed. and N. Y. State Mus. Rep. 51: 282. 1898 as *Carex straminea Crawei* Boott.

Carex foenea Willd. Grassy places, Vaughns, 1893. Determined by Dr. Peck. The var. *perplexa* Bailey has been found on "rocky hills near Whitehall" (Peck). N. Y. State Mus. Rep. 46: 52. 1893 Bot. ed. and N. Y. State Mus. Rep. 48: 44. 1896 Bot. ed.

Carex leptalea Wahl. Swamps and marshes; frequent.

Carex pauciflora Lightf. East Lake George marsh at Brayton, June 20, 1917.

Carex communis Bailey. Dry woods and fields; common. The var. *Wheeleri* Bailey is found in southern W. Fort Ann and at Vaughns. (*C. pedicellata* (Dewey) Britton.)

Carex pennsylvanica Lam. Dry woods and fields; abundant.

Carex varia Muhl. Woods northeast of Tripoli, May 28, 1897. Determined by Dr. Peck.

Carex Novae-Angliae Schwein. Devine's woods, Vaughns, fertile spikes 1–4 flowered, May 15, 1897. Determined by Dr. Peck.

Carex albicans Willd. Warrensburg (Peck).

Carex umbellata Schk. Dry pastures and sandy fields. East of Fort Ann; southern W. Fort Ann; Vaughns; Hudson Falls; Crescent. The var. *vicina* Dewey has been found at Vaughns.

Carex hirtifolia Mackenzie. Dry woods and thickets. Shushan (Dobbin); Vaughns; east of Crescent. (*C. pubescens* Muhl.)

Carex pedunculata Muhl. Dry woods and copses; abundant.

Carex eburnea Boott. Limestone rocks and cliffs. Skene's Mt., Whitehall; northwest Harford; Fort Ann and rocky hills 2 miles west; cliffs north of Lake Pond; Long Island, Lake George.

Carex aurea Nutt. Dry hillsides and fields. Southern W. Fort Ann; Vaughns; west of Kingsbury St.

Carex plantaginea Lam. Dry hilly and rocky woods, rarely in low shaded places; frequent.

Carex platyphylla Carey. Dry hilly woods; common.

Carex digitalis Willd. Woods and hillsides. Southern W. Fort Ann; Vaughns; Willard Mt.

Carex laxiculmis Schwein. Grassy woodlands and fields; scarce. Vaughns. Determined by Dr. Peck.

Carex albursina Sheldon. Rich woods and copses. Bacon hill, west of Fort Ann; near Tripoli; Vaughns; Anaquassacook hills, Shushan.

Carex blanda Dewey. Lake George (Jelliffe); southern W. Fort Ann; Vaughns. The var. **varians** (Bailey) has been found in southern W. Fort Ann; northeast of Glens Falls; Vaughns.

Carex laxiflora Lam. Grassy places and open places; common.

Carex anceps Muhl. Shushan (Dobbin); Tripoli; Vaughns. (*C. laxiflora patulifolia* Carey.)

Carex granularis Muhl. Woods and dry fields; common.

Carex Hitchcockiana Dewey. Rocky shaded places. Vaughns and vicinity. The var. *triflora* Pk. has been found on Mt. Defiance (Peck). N. Y. State Mus. Rep. 46: 51. 1893 Bot. ed. and N. Y. State Mus. Rep. 48: 66. 1896 Bot. ed.

Carex conoidea Schk. Grassy places; frequent.

Carex grisea Wahl. Fields and shaded places; common.

Carex gracillima Schwein. Woods and fields; abundant.

Carex prasina Wahl. Grassy and wet places, specially along streams. Southern W. Fort Ann; eastern Queensbury; Vaughns; east of Crescent.

Carex formosa Dewey. Grassy banks. Near Vaughns schoolhouse; ½ mile east of Tripoli. Determined by Dr. Peck.

Carex flexuosa Muhl. Woods; frequent. (*C. tenuis* Rudge.)

Carex arctata Boott. Moist woods. Mt. Defiance (Peck); Silver Bay (Kemp, in Herbarium of N. Y. Botanical Garden); Providence, also path to Lake Desolation (Burt); Fort Edward (Howe); near the falls, West brook, W. Fort Ann.

Carex castanea Wahl. Grassy places; rare. Fencerow 1½

miles east of Vaughns, June 1892, 1893; woods west of Smiths Basin.

Carex Sprengelii Dewey. Shaded places, usually calcareous rocks; rare. Mechanicsville (Peck); Shushan (Dobbin); Haynes hill and in woods west of Vaughns. (*C. longirostris* Torr.)

Carex Swanii (Fernald) Mackenzie. Dry pastures and woods. Vaughns; Shushan; north of Cambridge.

Carex virescens Muhl. Dry hilly woods. Warrensburg (Peck); Crosset Pond; southern W. Fort Ann.

Carex complanata Torr. Old pastures and dry open woods; abundant. (*C. triceps* Mx.)

Carex complanta Torr., var. **robusta** var. nov.

Culms rather stout, erect, 15′–3° tall; leaves 1½″–3″ wide; spikes 2 (rarely 3), oblong, very dense, 3″–12″ long, 3″–5″ in diameter, the terminal one conspicuously staminate at the base; scales brownish, scarious-margined, as long as or exceeding the few but distinctly nerved perigynia.

This distinct variety grows with the species, in the northwest corner of Alaric Freeman's meadow, next to Charles Bentley's pasture, about 1 mile north of Kingsbury Street. It was first found June 18, 1892 and several tufts of plants were seen in 1918. It matures a week or two earlier than the species.

"A form with oblong spikes. Mt. Defiance" (Peck) is probably referable to this variety. N. Y. State Mus. Rep. 34: 56. 1881.

Carex pallescens L. Clayey meadows and open woods; frequent.

Carex scabrata Schwein. Cold swamps and along mountain streams; frequent.

Carex limosa L. Southern part of E. Lake George marsh, June 20, 1917.

Carex paupercula Mx. Sphagnum marshes. The plants are referable to the var. *irrigua* (Wahl.) Fernald. Hartford (Howe); E. Lake George; marsh north of Glen Lake; Inman Pond. (*C. magellanica* of Am. auth.)

Carex stricta Lam. Wet places, forming tussocks in shallow water; common. The var. *angustata* (Boott) Bailey sometimes occurs with the species.

Carex torta Boott. Shushan (Dobbin). Determined by Dr. Peck. Rocky bank of Battenkill River at East Salem, June 15, 1907.

Carex gynandra Schwein. Middle Grove (Peck); eastern Queensbury.

Carex crinita Lam. Along streams, marshes and borders of ponds; common.

Carex lacustris Willd. Low grounds and about ponds forming swales; common. The plants are usually sterile. (*C. riparia* of Am. auth.)

Carex vestita Willd. Sandy clearing in Five Combine woods, east of Hudson Falls, June 2, 1892.

Carex lanuginosa Mx. Wet field, north of Hudson Falls, near Tefft's corner, May 23, 1896.

Carex lasiocarpa Ehrh. About ponds and mossy bogs; frequent. (*C. filiformis* of Am. auth.)

Carex Houghtonii Torr. Sandy field near Shield's estate, East Galway, July 11, 1880 (Burt). This is also recorded in N. Y. State Mus. Rep. 47: 41. 1894 Bot. ed.; N. Y. State Mus. Rep. 48: 87–88. 1896 Bot. ed.; and N. Y. State Mus. Bull. 176: 23. 1915.

Carex trichocarpa Muhl. Shushan (Dobbin).

Carex cryptolepis Mackenzie. Marsh north of Podunk Pond; Dolph Pond. *Carex flava*, var. *graminis* Bailey, with erect bracts has been found at Warrensburg (Peck). (*C. lepidocarpa* Tausch.)

Carex flava L. Wet places and low meadows; common.

Carex folliculata L. Wet woods. Moreau (Howe); Galway (Burt); near Fort Edward reservoir, probably Howe's station; Five Combine woods and Dailey's woods, near Hudson Falls.

Carex monile Tuck. Wet places, often in water. Lake Desolation (Burt); Mud Pond near Pattens Mills; Flat Rock near Fort Ann; Dailey's woods; Anaquassacook meadows, south of Shushan.

Carex rostrata Stokes. Wet bogs. Shushan (Dobbin); Dolph Pond; New Michigan Pond "Talman marsh." Not rare at Copeland Pond; determined by Dr. House. (*C. utriculata* Boott.)

Carex Tuckermani Dewey. Wet shaded places; uncommon. Assembly Point (Dr. Geo. D. Hulst, in Herbarium of Brooklyn Botanic Garden); Huletts Landing (Jelliffe); Mechanicsville (Peck); between Copeland and Hadlock Ponds; northwest Hartford; Dailey's woods; copse north of Devine's woods, Vaughns; along Battenkill River south of Shushan.

Carex retrorsa Schwein. Wet places; frequent. The var. *Hartii* (Dewey) Gray was found north of Vaughns, Sept. 4, 1891.

Carex lurida Wahl. Wet places; abundant.

Carex Baileyi Britton. Shaded swamps. Lake George (Hall); along road between Chestertown and Warrensburg (Peck); Lake George to Warrensburg; lower Black Mt. trail from Clemens; Dailey's woods.

Carex hystricina Muhl. Wet places; common. The var. *Dudleyi* Bailey has been found at Galway (Burt).

Carex Pseudo-Cyperus L. Lake Lauderdale, July 3, 1904.

Carex comosa Boott. Borders of ponds and marshes; frequent.

Carex intumescens Rudge. Wet woods, moist fields and swamps; common. The var. *Fernaldi* Bailey has been found in the copse north of Devine's woods; woods north of Cambridge.

Carex Asa-Grayi Bailey. Wet places in Devine's woods, Vaughns.

Carex lupulina Muhl. Wet places; common. The var. *Bellavilla* (Dewey) Bailey has been found at South Ballston (Peck). The var. *pedunculata* Dewey is occasionally found with the species.

Carex lupulina × retrorsa Dudley. South Ballston (Peck). Specimen in N. Y. State Herbarium.

Carex lurida × lupulina Bailey. Charlton. N. Y. State Mus. Rep. 33: 35. 1880 as *Carex tentaculata*, var. *altior* Boott. Specimen in N. Y. State Herbarium.

Hudson Falls, N. Y.

SOME WESTERN COLUMBINES

By T. D. A. Cockerell

Last year (Contrib. U. S. Nat. Herbarium, **20**: Part 4) Mr. E. B. Payson published a most interesting revision of the genus *Aquilegia* as found in North America, and this will naturally serve as a point of departure for new investigations. The subject is a difficult one, owing to the fact (as it seems to be) that any species in the genus will freely cross with any other; and, at least in our experience, the hybrids themselves are perfectly fertile. Thus, on grounds similar to those which convince us that there is only one living species of *Homo*, it may be maintained that there is possibly only one genuine species of *Aquilegia*. Nor is this all; just as *Bursa bursa-pastoris* var. *heegeri* (commonly called *Bursa heegeri*) is a form lacking the most prominent character of the genus to which it belongs,* so *Aquilegia vulgaris* var. *stellata* and *A. caerulea* var. *daileyae* lack the generic character of spurred petals, so that but for their obvious general affinities we might not regard them as columbines at all. This plasticity is remarkable in a genus which in many respects seems highly modified. The long spurs are adapted to the visits of butterflies, but I have seen a bumble-bee (*Bombus*) slit up a spur from the side, and thus get at the nectar illegitimately. The columbine in which this occurred was *A. caerulea*. Mr. Payson suggests that "the modern species of *Aquilegia* seem to have been developed from species having blue flowers. These seem first to have given rise to white-flowered, these to yellow-flowered, and these finally to red-flowered species." There is apparently no basis for such an evolutionary sequence, for the yellow in the flowers is due to plastids, readily visible under the microscope; while the blue and red are equally due to anthocyanins, held in solution in the sap. Gaston Bonnier, in his scheme of relationships of Ranunculaceous genera, indicates an affinity between *Aquilegia* and *Helleborus*, while the latter leads back to *Caltha*, etc. The suggestion might be, that the original columbines were

* For a good figure, see Shull, Zeits. f. indukt. Abstamm. u. Vererbungslehre. 12: 98. 1914.

yellow or white, if there was any well marked sequence in the evolution of color. Purple, however, is already a prominent color in species of *Helleborus*, and it is evident that anthocyanins and yellow plastids both antedate the evolution of *Aquilegia*.

A few years ago* I described a hybrid between *A. desertorum* and *A. chrysantha*. Our plant of *A. desertorum*, obtained in Santa Fé Cañon in 1912, and then evidently of considerable age, is as vigorous as ever in 1919. It proves fertile with its own pollen, and we have seedlings from it already in flower, perfectly true to type. It has been and still is a question whether the differences between *A. desertorum* and *A. elegantula* may be due to environment and hence not truly specific. Mr. Payson treats them as distinct species, but declares that *desertorum* is known only from Arizona, though he quotes my remarks on the New Mexico plant. A specimen obtained by Heller nine miles east of Santa Fé, and therefore very near the locality of my *desertorum* plant, is referred by Payson to *elegantula*. An analysis of the characters of my plant, with Payson's descriptions before me, appears to indicate *desertorum* rather than *elegantula*, but it agrees perfectly with neither. The leaves are early glaucous, but at maturity clear green above. Only the leaflets of the flowering stems are small; the basal leaves have them very large, the apical leaflet 40 mm. long and 38 wide. The better developed flowering stems bear well-developed leaves, but this can hardly be a specific character. The leaflets have a quite dense erect pubescence on the under side, which is a *desertorum* character. (*A. chrysantha* has this pubescence less dense, but still very evident; but singularly enough the *chrysantha* × *desertorum* hybrid has only a very few widely scattered hairs.) The spurs are about 22 mm. long, thus agreeing better with *desertorum*, and the sepals are red, pallid at tip. The original *elegantula*, as described by Greene, had light green sepals. The sepals however are erect, not spreading as they should be in *desertorum*. The follicles have the tips widely spreading.

On the basis of the above characters, it might appear that the Santa Fé Cañon *desertorum* should be separated both from the

* Botanical Gazette **62**: 413. 1916.

true *desertorum* of Arizona and the typical *elegantula* from near Mancos, Colorado. It seems more probable, however, that all three represent phases of a single species. Mr. D. M. Andrews has recently collected *elegantula* in Colorado, and thinks that it is separable from my plant on account of the habit of growth. We do not yet know how far this may be due to differences in environment.

The F_2 plants from *desertorum* × *chrysantha*, raised by my wife, flowered this year. The most curious form shows doubling, with twisting of the spurs. The spurs vary from 6 to 9, but the laminae of the petals are supplemented internally by a variable number of emarginate laminiform appendages.

This year we have an authentic *A. caerulea* × *desertorum* in flower. The flowers are formed as in *caerulea*, with pure white laminae; but are smaller, the sepals pale lilac tipped with white, the spurs rosy-lilac. In bud the spurs are suffused with red. The leaflets are pubescent beneath, the hair short but abundant. Spurs 28 mm. long, laminae 11 mm; sepals about 20 mm. long and a little over 8 mm. wide. In full flower the spurs are moderately divergent. The leaflets are large, even on the flowering stems.

We also have this year a varied series of F_2 plants from *A. caerulea* × *chrysantha*. *A. chrysantha* has yellow flowers, often with some anthocyan tints, which then are red, but never sufficiently to affect the general yellow effect. The sepals are prevailingly narrower than in *caerulea*, but variable. The F_1 from *caerulea* × *chrysantha* is pale blue with the laminae yellow, fading to nearly white. The F_2 plants include such as the following:

(*a*) Form of *caerulea*, with broad sepals, but laminae entirely bright lemon yellow; sepals dilute rosy purplish, more or less suffused with yellow, especially at tips; spurs pale yellow, apically suffused with dilute purplish; buds strongly pinkish, including spurs. Thus the buds show the acid state of the anthocyanin, which is retained to maturity in *chrysantha*, but the hybrid is affected by the *caerulea* ancestry. This type of F_2 hybrid occurs only in a small percentage of the plants.

(*b*) Sepals broad as in *caerulea*; flowers white, very delicately tinted with purple on sepals and often on spurs.

(*c*) Similar to the above, but with less of the purplish tint (more on spurs), and the whole flower (especially laminae) is very pale yellow. Others show more of the purplish and brighter yellow, intermediate between a and c.

The factorial analysis of these forms cannot yet be clearly made. *A. caerulea* in the western part of its range is not blue but white, but there is no evidence that the plants we used carried a recessive white. We can however postulate that yellow plastids (*chrysantha*) are allelomorphic to their absence (*caerulea*), and abundant anthocyanin (*caerulea*) to little or none (*chrysantha*). It we call the factors respectively P, p, A, a, the F_1 hybrid will have the formula PpAa, and will combine blue with yellow, as it actually does, with non-acidity also dominant over the acid condition of *chrysantha*. In the F_2 9 out of 16 should look like the F_1; three should resemble *caerulea*, three *chrysantha*, and one might be expected to be white, feebly or not tinted with anthocyanin. Evidently other factors are involved, for as a matter of fact the pallid (supposedly double recessive) flowers are numerous.

Genuine *A. caerulea* produces some hitherto unrecorded variations. Mr. D. M. Andrews has at Boulder, Colorado, a large stand of very fine and typical *caerulea*, the seed having been obtained from the Blanchard ranch in Boulder Cañon. The strain originated in the nearby mountains, and is in general extremely uniform. But as Mr. Andrews pointed out to me, there are a few plants abruptly and conspicuously varying from the type:

1. Laminae of petals blue like the sepals, elongate, narrow (*e.g.*, 40 mm. long and 8 wide); spurs normal, varying to small and more or less aborted. A few plants. This is more or less intermediate between the typical form and variety *daileyae*, but distinct from both.

2. Flowers very pale, light yellowish or greenish in bud, eventually delicately tinted with purplish. Sepals and petals 9 to 10, the sepals reflected at maturity, placed just below the outwardly-turned spurs; laminae remaining erect, lanceolate, about as long (20 mm.) as the spurs. The sepals are mainly

pale green, the laminae delicate purplish one plant only. This has an atavistic appearance, and is quite without the beauty of normal *caerulea*.

These observations indicate that *Aquilegia* is an unusually favorable genus for the investigation of genetic problems. Some of its advantages are the following: (1) The ready hybridization and fertility of the F_1; (2) the tendency to mutate, apart from crossing; (3) the existence of spurred and spurless forms, and of forms with and without colored plastids and anthocyanin colors; (4) the heterozygotes can be easily preserved and propagated by dividing the crowns; (5) incidentally, beautiful and interesting garden plants are produced.

SHORTER NOTES

Rhamnus dahurica IN MICHIGAN.—South of Ann Arbor, Michigan, is an extensive area of level ground formerly occupied chiefly by tamarack, black ash, and other hydrophytic trees. The ground water lies always near the surface and parts of the area were originally very swampy. Recent construction of drainage systems has destroyed much of the swamp, which has been put under cultivation, but the rest of the tract is still in forest.

Five years ago a forestry class of the University of Michigan discovered in the heart of the swamp a tree unknown to them. It was submitted to the writer for identification and proved to be *Rhamnus dahurica*. It was then supposed that the tree had been planted by Mr. J. B. Steere, who owns part of the land and had travelled extensively in the Orient. In 1916 Mr. Steere pointed out a second tree to the writer, some two miles from the first one, with a request for its identification. He was surprised to learn its name and disclaimed any knowledge of its origin. Only one tree of the species is known in cultivation in the vicinity, which, since it is a smaller tree, can scarcely be considered as the parent of these two individuals.

The two apparently wild trees are 500 yards or more from any residence, either past or present. One is in the middle of a forest

tract; the other along a small ditch separating two cultivated fields, but it obviously antedates the construction of the ditch. Each is about thirty feet high, with widely spreading branches in healthy condition, and bears a good crop of fruit. Seedlings have not been seen.—H. A. GLEASON.

NEWS ITEMS

According to The Cambridge Tribune of June 28, Harvard University benefits from the will of the late Dr. W. G. Farlow, professor emeritus of cryptogamic botany. All of his books, papers, manuscripts, etc., are left to the University, to constitute the Farlow Reference Library. The sum of $25,000 is left in trust to his assistant, A. B. Seymour, who will enjoy its income during his life. On his death this fund will be added to a gift of $100,000 previously made to Harvard and known as the John S. Farlow Memorial Fund. On the death of Professor Farlow's widow, $100,000 will be given to the University and added to the John S. Farlow Memorial Fund.

In connection with the commencement exercises of the University of Vermont, held in Burlington on June 25, the degree of doctor of letters was conferred upon Dr. Liberty Hyde Bailey, formerly director of the College of Agriculture of Cornell University, and the honorary degree of doctor of science was conferred upon Dr. Marshall Avery Howe, curator of the museums of the New York Botanical Garden.

Dr. H. N. Whitford, of the School of Forestry of Yale University, has recently returned from Central America, where he was one of a commission detailed by the State Department to investigate the economic resources of the boundary region in dispute between Guatemala and Honduras.

TORREYA

Vol. 19 No. 8

August, 1919

SCROPHULARIACEAE OF THE LOCAL FLORA. II

By Francis W. Pennell

Continued from June Torreya

5. Limosella L. Sp. Pl. 631. 1753.

Type species, *L. aquatica* L., of Europe.

1. Limosella subulata Ives in Trans. Phys. Med. Soc. N. Y. **1**: 440. 1817. "First observed in 1816. . . It flourishes in great abundance in the Housatonic, and in most of the rivers which empty into Long Island Sound, within the range of the tide."

   Ygramela (or *Limosella*) *maritima* Raf. Atl. Journ. 199. 1833. "Discovered this year in the wet sand of the sea islands of New Jersey." As a new genus, this was based upon specimens the flowers of which bore but two stamens. Certainly an abnormal form, as the plant of such situations has normally four stamens.

Flowering from late August to November, and soon ripening fruit.

Tide-water river-beaches, saline, brackish or fresh, and about borders of ponds, brackish or fresh, along the coast. Margins of ponds back of sand-dunes, growing inundated or somewhat emersed on the sandy coastward margin of these, Long Island and southward to Ocean County, New Jersey; on the sandy or gravelly flats between high and low tide, along the Housatonic, Hudson, Passaic, Delaware, and doubtless other rivers. The plants of the two environments differ slightly, as has been indicated in Torreya **19**: 51. 1919. This species ranges from Labrador to Maryland.

[No. 7, Vol. 19 of Torreya, comprising pp. 125–142, was issued Sept. 10, 1919]

6. GRATIOLA L. Sp. Pl. 17. 1753.

Type species, *G. officinalis* L., of Europe.

Corolla slightly exceeding calyx, externally glabrous. Capsule nearly pyramidal, acuminate. Pedicels very short. Stem pubescent with several-celled hairs. (*Pilosae.*) — 1. *G. pilosa*

Corolla more than twice as long as the calyx, externally more or less puberulent. Capsule broader, acute to rounded. Pedicels longer. Stem glabrous or puberulent with one-celled hairs, these frequently gland-bearing.

- Pedicels exceeding 10 mm. in length. Corolla within throat on posterior side densely pubescent with knobbed hairs. Capsule ovate, equaled or exceeded by the sepals. Seeds 3–5 mm. long, semiglobose to oblong.
  - Capsule 1–3 mm. long, exceeded by the sepals. Stem-leaves clasping by a broad base, usually at least the upper with resinous dots. Roots perennial, slender. Stoloniferous. (*Ramosae.*)
    - Corolla golden-yellow throughout. Capsule 3 mm. long, little exceeded by the sepals. Leaves lanceolate to nearly ovate, entire or distally obscurely denticulate, with blackish glandular dots.
      - Leaves linear to lanceolate, frequently denticulate distally, usually strongly puncticulate. Sepals obtusish to acute. — 2. *G. aurea.*
      - Leaves lanceolate to nearly ovate, entire, obscurely puncticulate distally. Sepals very obtuse. — 2a. *G. aurea obtusa.*
    - Corolla with throat dull-yellow, the lobes white. Capsule 2 mm. long, much exceeded by the sepals. Leaves ovate, serrate, the upper sometimes with sparse glandular dots. — 3. *G. viscidula.*
  - Capsule 4–5 mm. long, about equaled by the sepals. Stem-leaves narrowed to a sessile or slightly clasping base, not resinous-dotted. Roots annual, the main root thick and giving off numerous fibers. Not stoloniferous. (*Neglectae.*) — 4. *G. neglecta.*
- Pedicels less than 5 mm. in length. Corolla within throat on posterior side pubescent with knobless hairs. Capsule globose, 5–6 mm. long, slightly exceeding the sepals. Seeds 7 mm. long, linear. Leaves and root as in *Neglectae.* (*Virginianae.*) — 5. *G. virginiana.*

1. GRATIOLA PILOSA Michx. Fl. Bor. Am. 1: 7. 1803. "Hab. in Carolinae inferioris uliginosis." Description sufficiently distinctive.

Sophronanthe pilosa (Michx.) Small, Fl. S.E. Un. St. 1067, 1338. 1903.

Flowering mid-July to late September, and soon ripening fruit.

Moist sandy pineland, in potassic soil, Cape May District and locally in Camden County in the Middle District, of the Coastal Plain of southern New Jersey. Ranges from New Jersey to Florida and eastern Texas, in the Coastal Plain.

2. GRATIOLA AUREA Pursh, Fl. Am. Sept. 1: 12. 1814. "In sandy wet places, in the pine-barrens of New England, New Jersey and Carolina . . . v. v.; v. s. in Herbario Banksiano." Description distinctive, here restricted to the northern first-mentioned plant.

Flowering from early June to late September, and soon ripening fruit. Apparently fruit is sparingly matured, the plant increasing mainly by stolons.

Wet sandy potassic soil, margins of ponds; frequent in the Coastal Plain of Long Island and New Jersey, especially in the Pine Barrens; occasional about lakes in the glaciated region above the Fall-line, at least at Lake Hopatcong, Morris Co., New Jersey. Ranges from Maine and eastern Ontario to Virginia.

2a. **Gratiola aurea obtusa** Pennell, var. nov.

Plant erect, 1.5 dm. tall. Leaves lanceolate to ovate, 1.5 cm. long, entire, obscurely puncticulate distally. Sepals 3 mm. long, very obtuse. Corolla 10–12 mm. long.

Type, gravelly shores of Delaware River, between high and low tide, Fish House, Camden Co., New Jersey, collected in flower by Stewardson Brown; in herb. Academy of Natural Sciences of Philadelphia.

Gravelly or sandy shores of Delaware River, between tides, Mercer and Camden counties, New Jersey, and Philadelphia Co., Pennsylvania.

3. **Gratiola viscidula** Pennell, nom. nov.

Gratiola viscosa Schwein.; Le Conte in Ann. Lyc. N. Y. 1: 106. 1824. "Inhabits Virginia, and the upper parts of North Carolina." Apparently the plant now considered, although the description appears inaccurate in stating

that the capsule is as long as the sepals. Not *G. viscosa* Hornem. Enum. Pl. Hort. Hafn. 19. 1807.

Flowering from mid-July to September, and soon ripening fruit.

Swales and swamps, along streams, in potassic soil, at a few stations in the Piedmont of northern Delaware. Ranges from Delaware to upland Georgia and eastern Tennessee.

4. GRATIOLA NEGLECTA Torr. Cat. Pl. N. Y. 89. 1819. "Within thirty miles of the City of New York." In the herbarium of Columbia University are two sheets, probably representing but one collection, both labeled "*Gratiola virginica* Linn., Torr. Fl. N. Y., 2, p. 37." It is possible that one or both of these are Torrey's plants of *G. neglecta*. The latter was described as distinct from *G. virginiana* because of the lack of the rudimentary antero-lateral filaments. Five years later, in his Flora of the Northern States, Torrey was persuaded that this lack was true of *G. virginiana*, and on that account reduced his earlier species. Still later, in 1843, in his Flora of New York, he described such rudiments as present, and held as erroneous his previous observations. The truth, as confirmed by an extensive examination of fresh flowers, is that these rudiments may be small, or reduced to one, or altogether absent; all stages are to be found in the same colony. The name is here used for the species which has long been known as *G. virginiana*.

Conobea borealis Spreng. in Neue Entdeck. 3: 26. 1822. "Hab. in locis humidis prope Noveboracum. . . ." This is virtually a re-description of *Gratiola neglecta* Torr., although sufficient new matter is added to indicate that Sprengel must have seen a specimen of this. The change of generic classification is doubtless due to the discovery of sterile rudiments of the antero-lateral filaments.

Flowering from late May to late September, and soon ripening fruit.

Wet loam, woodland or open, in potassic soil, common above the Fall-line; and through the Middle District of the Coastal

Plain. Ranges from Maine and Quebec to British Columbia, southward to Georgia, Texas and California.

5. GRATIOLA VIRGINIANA L. Sp. Pl. 17. 1753. "Habitat in Virginia." Although Linné had specimens of the plants here called *G. neglecta* in his herbarium in 1753, his description is taken solely from Gron. Fl. Virg. 6, 1743, and so is based upon *Clayton 379.* This, as shown by Dr. S. F. Blake in Rhodora **20**: 65, 1918, is the plant which has been known as *G. sphaerocarpa* Ell.

Flowering from mid-May to September, and soon ripening fruit.

Wet loam, in shade, occasional in the Middle and Cape May Districts of the Coastal Plain of New Jersey, and below the Fall-ine in Delaware. From Burlington, N. J. southward to Florida and Texas, extending inland to the southern Appalachians.

7. MIMULUS L. Sp. Pl. 634. 1753

Type species, *M. ringens* L.

Corolla yellow. Capsule dehiscent laterally, apex persistent and valves permanently attached to axial cell-wall. Seeds ellipsoid-orbicular. Stems pubescent. Species introduced. (*Simiolus* Greene.)

Corolla 12–20 mm. long. Leaves 3–4 cm. long. Stems loosely lanose, slender, lax. 1. *M. moschatus*

Corolla 30–35 mm. long. Leaves 4–5 cm. long. Stems glabrous to finely glandular-pubescent, stout, erect. 2. *M. guttatus.*

Corolla lavender-violet. Capsule dehiscent laterally from very apex, and its valves splitting from the persistent axial cell-wall. Seeds oblong. Stems glabrous. Species native. (*Eumimulus.*)

Leaves ovate, petioled. Angles of stem slightly winged. Pedicels stout, in fruit 5–10 mm. long. Calyx-lobes setaceous-tipped, 1–2 mm. long. Corolla 35 mm. long. Seeds pale-yellow. 3. *M. alatus.*

Leaves lanceolate, clasping. Angles of stem not winged. Pedicels slender, in fruit 30–60 mm. long. Calyx-lobes lanceolate, 3–5 mm. long. Corolla 30 mm. long. Seeds brownish. 4. *M. ringens.*

1. MIMULUS MOSCHATUS Dougl.

Aquatic in running streamlets or in bogs; rare; seen only from Queens and Sullivan counties, New York and Lehigh County,

Pennsylvania. Certainly an escape from cultivation on Long Island, but in the mountain habitats it appears as if native. A native of the Rocky Mountains, occurring eastward in northern Michigan, Newfoundland and northern New England.

2. Mimulus guttatus DC.

Meadows and along streams, rarely escaped from cultivation; seen from Litchfield County, Connecticut, and Delaware County, New York. Native of western North America.

3. Mimulus alatus Ait. Hort. Kew. **2**: 361. 1789. "Nat. of North America. Introd. 1783, by Mr. William Malcolm."

Flowering from late July to early September, and soon ripening fruit.

Shaded swamps and along streams, in potassic soil, frequent, becoming rare northward, through the area above the Fall-line; occasional in the Middle District of the Coastal Plain of New Jersey. Ranges from Connecticut to Ontario and Kansas, southward to Florida and Louisiana.

4. Mimulus ringens L. Sp. Pl. 634. 1753. "Habitat in Virginia, Canada . . . Hort. ups. 176. t. 2." In the Hortus Upsalensis 176, pl. 1, 1748, Linné described and figured our plant.

Flowering from early July to mid-September, and soon ripening fruit.

Open swales and along streams, more rarely in shaded swamps, in potassic and calcareous soils, common throughout the area above the Fall-line, of more rare occurrence through the Middle District and Coast Strip of the Coastal Plain. Ranges from Nova Scotia to Alabama, Minnesota and Kansas.

8. Ilysanthes Raf. Ann. Nat. 13. 1820

Type species, *I. riparia* Raf., of the Ohio valley.

Leaves 1–3 cm. long, obviously attenuate at base. Pedicels relatively stout, at least in fruit, shorter than the bracts. Sepals usually finely pubescent, usually about equaling the capsule.

Leaves lanceolate to ovate-lanceolate, usually only the lowermost obtuse. Fruiting pedicels 5–10 mm. long. Plant diffuse. 1. *I. dubia.*

Leaves elliptic-oval, all obtuse. Fruiting pedicels 3–5 mm. long. Plant erect. *1a. I. dubia inundata.*
Leaves .5–1.5 cm. long, rounded at base, or at least broadest much below the middle. Pedicels filiform, longer than the bracts. Sepals glabrous or nearly so, shorter than the capsule. *2. I. inaequalis.*

1. ILYSANTHES DUBIA (L.) Barnhart.

Gratiola dubia L. Sp. Pl. 17. 1753. "Habitat in Virginiae aquosis." Type, *Clayton 164*, identified by Dr. B. L. Robinson in Rhodora **10**: 67. 1908, as the species here considered.

Capraria gratioloides L. Syst. ed. X. 1117. 1759. Based upon *Gratiola dubia* L.

Ilysanthes gratioloides (L.) Benth. in DC. Prod. **10**: 419. 1846.

Lindernia gratioloides (L.) Lloyd & Fouc. Fl. Ouest Fr. ed. IV. 246. 1886.

Ilysanthes dubia (L.) Barnhart in Bull. Torr. Club **26**: 376. 1899.

Flowering from early July to October, and soon ripening fruit.

Swamps, in potassic soil, frequent above the Fall-line and in Middle and Cape May Districts of the Coastal Plain. Ranges from New Brunswick and Ontario to Florida and Texas.

1a. **Ilysanthes dubia inundata** Pennell, var. nov.

Plant erect, 1.5–2 dm. tall. Leaves elliptic-oval, obtuse, 1.5–2 cm. long Pedicels in fruit but 3–5 mm. long.

Type, sandy tidal flats of Delaware River above Delair, Camden Co., New Jersey, collected in fruit September 3, 1915, *Pennell 6496;* in herbarium New York Botanical Garden.

Tidal flats of Passaic River, New Jersey, of the Delaware River in New Jersey, Pennsylvania and Delaware. Also seen from along the Potomac River near Alexandria, Virginia.

2. **Ilysanthes inaequalis** (Walt.) Pennell, comb. nov.

Gratiola inaequalis Walt. Fl. Carol. 61. 1788. Probably from lower South Carolina, a district where the plant here considered is frequent. Identified by Michaux, Fl. Bor. Am. **1**: 7. 1803 as questionably his own *Gratiola*

anagallidea, and by Elliott, Sketch Bot. S. C. & Ga. **1**: 16. 1816, identified and carefully described under the name *Lindernia dilatata* Muhl. Both the latter specific names are synonyms of this.

Flowering from late June to late September, and soon ripening fruit.

Swamps, in potassic soil, frequent throughout the Coastal Plain excepting the Pine Barrens, and, occasionally extending somewhat above the Fall-line. Ranges from Massachusetts to Florida and Texas.

9. HEMIANTHUS Nutt. in Journ. Acad. Nat. Sci. Phila. **1**: 119. 1817.

Type species, *H. micranthemoides* Nutt.

1. **Hemianthus micranthus** (Pursh) Pennell, comb. nov.

Herpestis micrantha Pursh, Fl. Am. Sept. **2**: 418. 1814. "On the banks of rivers, at the edge of low water mark: Pennsylvania to Virginia." Described as with five-leaved calyx, but no other plant can possibly be intended.

Hemianthus micranthemoides Nutt. in Journ. Acad. Nat. Sci. Phila. **1**: 119. *pl. 6.* 1817. "Habitat on the gravelly banks of the Delaware, overflowed by the tide, near Kensington [Pennsylvania]." Type seen in the herbarium of the Academy of Natural Sciences.

Micranthemum micranthum (Pursh) Wood, Class-Book 525. 1861.

Micranthemum Nuttallii A. Gray, Man. Bot. N. Un. St. ed. V. 331. 1867. "*Hemianthus micranthemoides* Nutt. . . . Tidal muddy banks of the Delaware River, and southward." Typified by plant of Nuttall.

Micranthemum micranthemoides (Nutt.) Wettst. in Engl. & Prantl, Natür. Pflanzenfam. **4**^{3b}: 77. 1891.

Globifera micranthemoides (Nutt.) Kuntze, Rev. Gen. 461. 1891.

Flowering from early September to October, and soon ripening fruit.

Gravelly or sandy river-shores, between high and low tides,

Delaware and Chesapeake drainage. Along the Delaware River in New Jersey, Pennsylvania and Delaware. Also along the Potomac River in Virginia.

10. Linaria Mill. Gard. Dict. ed. IV. 1754

Type species, *Antirrhinum Linaria* L. of Europe.

Corolla, excluding spur, 15–18 mm. long, yellow; posterior lip arched over anterior; anterior lip forming a conspicuous protruding orange palate; spur tapering from a broad stout base. Capsule 10 mm. long, much exceeding the sepals. Style 8 mm. long. Seeds 1.7 mm. long, flattened and circularly broadly-winged. Stem 3–10 dm. tall, densely leafy; without sterile prostrate branches from the base.
(*Linaria*, sensu strictu.) 1. *L. Linaria.*

Corolla, excluding spur, 7–8 mm. long, blue; posterior lip erect; anterior lip broadly spreading, but not forming a definite raised palate; spur very slender throughout. Capsule 2 mm. long, equaling to slightly exceeding the sepals. Style .8 mm. long. Seeds .3–.4 mm. long, cylindric, prismatic-angled, not winged. Stem very slender, 2–8 dm. tall, less leafy; with sterile prostrate branches from base.
(*Leptoplectron*, sect. nov.) 2. *L. canadensis.*

1. Linaria Linaria (L.) Karst.

Linaria pensylvanica Scheele in Flora **26**: 586. 1843. "Aus Pensylvanien." Described as differing from *L. vulgaris* (= *L. Linaria*) by having the raceme axis and pedicels quite smooth instead of glandular-pubescent. *L. Linaria* varies freely between these two states.

Loam or sandy soil, fields and waste ground, common above the Fall-line, less common through the Coastal Plain. Naturalized from Eurasia.

2. Linaria canadensis (L.) Dum.-Cours.

Antirrhinum canadense L. Sp. Pl. 618. 1753. "Habitat in Virginia, Canada." Specimen in Linnean herbarium credited to Canada should be the type. This is probably a plant collected by Kalm, and as Kalm spent much time near Philadelphia, especially on Raccoon Creek, Gloucester Co., New Jersey, in a district where this plant is very common, his specimen is probably from there. In Kalm's Travels **1**: 358. 1770, this species is mentioned as if

common at Raccoon. Moreover it is a plant of rare occurrence and obviously recent introduction in any part of Canada.

Linaria canadensis Dum.-Cours. Bot. Cult. 2: 96. 1802. "Lieu. Le Canada, la Virginie." Doubtless based upon *Antirrhinum canadense* L.

Flowering from late April to October, and soon ripening fruit.

Open sandy potassic soil, frequently a weed; thoughout the Coastal Plain of Long Island and New Jersey, but likely introduced into the Pine Barrens; above the Fall-line occasionally introduced along railroad-tracks. Ranges from Massachusetts to Florida and Texas.*

(*To be continued.*)

REMINISCENCES OF ORCHID-HUNTING

By Herbert M. Denslow

One who has much to do with orchids garners a store of happy memories. The writer's acquaintance with this fascinating family began in the year 1867 and extends over a period very nearly the same as the life of the Torrey Club. These recollections, however, do not really cover this half century, but are concerned chiefly with about a dozen years at the beginning of it and as many more since the year 1905. The interval was too much occupied with professional duties to leave more than occasional scraps of time for any hobbies. They were not barren years, for they included some fascinating excursions and thrilling discoveries; but they are not so crowded, in retrospect, with memories of orchid-hunting as are the earlier and the later periods.

The earliest picture is of an extensive cranberry bog, long since drained and cultivated, in East Haven, Connecticut, in which on one unforgettable summer day, the novice, who had

* The following plants are to be considered as scarcely established.

Cymbalaria Cymbalaria (L.) Wettst., from Eurasia, is occasional along roadsides, and elsewhere near old gardens.

Kickxia Elatine (L.) Dumort. and K. spuria (L.) Dumort., both from Eurasia, are occasionally seen, mostly on ballast.

never seen even one orchid before, was introduced to three most attractive species, *Pogonia ophioglossoides*, *Calopogon pulchellus* and *Habenaria ciliaris*. There were other interesting plants in that bog, but no *Vaccinium* nor *Andromeda* nor *Cassandra*, nor all the rest, made any impression, in comparison with the orchids, all of which were in great profusion and in perfect bloom. From that day the writer dates the incomparable joys of orchid-study in field and forest and bog, and in books and conversations, during more than fifty years. There were many botanizing excursions near New Haven during the next few years, but no memories are particularly vivid, except those of collecting *Arethusa* in abundance, including one plant that bore two scapes and three flowers, in a bog that is now dry land, and of finding an occasional plant of *Isotria verticillata* in fruit, never one in flower, in the woods adjacent to Edgewood, the home of Ik Marvel.

On the upper end of Manhattan Island there were native orchids in those days. In a bank by the side of a private road leading up through the woods from the New York Central Station at Inwood, was a small colony of *Tipularia*. Between that spot and "the Kingsbridge Road," were found occasionally *Liparis liliifolia*, *Goodyera pubescens*, *Corallorrhiza odontorhiza*, *Spiranthes gracilis* and *Spiranthes cernua*; authentic specimens of which are preserved in the local herbarium of the New York Botanical Garden. The writing of these names reminds one of the changes in nomenclature, as well as in the region, since those earlier days; but these binomials are adequate for identification.

Most of the writer's orchid-hunting in recent years has been done in the town of Fairlee, Orange County, Vermont, where within about two square miles thirty-three species have been found, nearly one half of those listed in Gray's Manual. This surprising result began just ten years ago with the finding of *Cypripedium arietinum* in a most unexpected place. There hadn't been any search for it; the writer was scrambling up a steep mountain, and there, on a dry slope, appeared this *rara avis*. The books report it as growing in bogs. It does; but it thrives on this stony declivity, where the slope is from 45° to 60°, where

the ground is dry almost at once after rain. It is restricted to an area of a few square rods, at an elevation of about 1000 feet. There are more than two hundred plants. They grow chiefly in groups of from three to six, and multiply apparently by seed, which falls straight or is scattered a few feet by wind. This year scores of plants blossomed and nearly every blossom was fertilized, promptly; the anthesis is not longer than ten days. Evidently this orchid can get along with very little water. If we knew more about some species we should hesitate to indicate for them any restricted environment; and we should know more about them and less often call them "rare," if we could go oftener to the secluded spots in which they delight to live.

The most frequent orchid in Fairlee is *Habenaria Hookeri*. It is found on every wooded hill, sometimes even on roadside banks. In one morning's ramble of three hours up and down on a small mountain, two hundred and seventeen plants of this species were counted, of which about one seventh were blossoming. *H. orbiculata* grows in the same woods. It is less frequent and is now being exterminated by the logging that is stripping the hillside. Of these two related species, *H. orbiculata* seems to prefer to grow on a slope, *H. Hookeri*, in more level or sunken spots. The size of the leaves at anthesis, is no indication of the species; even *H. macrophylla* sometimes has leaves smaller than are found on some plants of *H. Hookeri*. Where *H. orbiculata* is fairly abundant, as it was on that now denuded hillside, it is a fine sight to look up the slope and see the many tall scapes with their striking flowers. This species is more readily discerned at a distance than *H. Hookeri*, not only because it is taller, but because it generally grows in more open spots. *H. macrophylla* is much rarer; though, in the summer of the year 1918, near St. Johnsbury, Vermont, it was found oftener than *H. obiculata*. Perhaps these are not specifically distinct.

The latest species to be discovered, of the thirty-three now known in Fairlee, are the two northen Listeras, *L. convallarioides* and *L. cordata*, the former flourishing in a high, open swamp, the other, dying out, quite in contrast to its appearance on Mt.

Killington, thirty-six years ago, where, in a mossy belt that encircles the peak at an elevation of 3,500 feet, it was as frequent and as strongly intrenched as dandelions on a lawn.

The pleasures of recent discovery have not all been experienced in Fairlee. They include the sudden view of a sunny hillside in open woods, in Albemarle County, Virginia, fairly studded with prosperous plants of *Liparis liliifolia*; the finding of *Orchis spectabilis* in the same woods in bloom on April 30 and of *Isotria verticillata* not far away, almost in a farm yard, a week later; the meeting of *Cypripedium arietinum* as frequently as *H. Hookeri*, in dry woods again, and even on exposed rocks, in Essex County, New York; and the much prized opportunity of studying *Aplectrum* during one whole summer, from the withering and decay of the old leaves until the appearing in early September of the reddish-brown tips of the next winter's foliage. This plant is perhaps local rather than rare. Its peculiar habit helps to hide it. For three months, the months in which the collector is most busy, one could walk over the temporary graves of this abnormal species without suspicion of its nearness, unless there had been a flowering scape and some of its ovaries had become fertile. These exceptions are infrequent; for only a small percentage of the bulbs send up scapes and, if these are not promptly visited by the proper insects, they shrivel and die within a few days. If, however, any one of the six to ten flowers on a scape is fertilized all are apt to share the benefit; and the strong stalks with their big capsules become conspicuous during the next summer or in the ensuing spring. Like many of the rarer orchids, *Aplectrum* is more likely to be found by apparent chance than by search.

For, orchid-hunting is an adventure always. It is impossible to predict that any species will be found in a certain locality or environment, however right and proper they may seem to be. Some lack or superfluity, in soil or surroundings, the crowding of some alien neighbors, the failure of a sheltering umbrage, the disappearance of some insect life may have caused extermination; or the species may never have found the apparently favorable habitat, where you seek for it in vain. The orchid-lover in

a new region is a true pioneer. Every step is an adventure, every moment pregnant with possibilities of delightful surprise. He may ramble or scramble for an hour without one cheering sight; when he pauses to take breath or to get his bearings, he may look down and see a *Listera* or some rarer *Habenaria* waiting to be admired. He may even hesitate to gather the treasure, for he knows that it will never present again an aspect so altogether charming as in its chosen place of growth. The collector of terrestrial orchids is bound to be something better than a hunter. In the tropics, gathering orchids may be chiefly commercial; in our zone, it is aesthetic in good part. The diligent searcher for these alluring denizens of meadow, bog and forest is not desirous simply to find herbarium specimens or to add to the number of local species; he enjoys the living plants, appreciates their oddities, is charmed by their almost bewildering variety of form and function, studies them in their homes, in their life. He enjoys the hunting, too, even when it is for the time unrewarded, for his search takes him into secluded places, where the silence sometimes is "wide, velvety, complete"; where, with happier frequency, the solitude is vocal with the songs of birds or thrilling with the myriad, incessant, little noises of the wild; or his footsteps wander over a carpet of *Linnaea* or sink with cushiony comfort into fragrant beds of sphagnum; he tiptoes around or over quaking bogs and pauses to scrutinize tuft and tussock for an *Arethusa* or a *Listera*; while every moment he is pleasurably aware that his next glance may fall on some desired species that he has hunted for years or, with almost equal satisfaction, on one well-known, but beautiful, and not disesteemed because familiar. Each orchid-lover who is able to roam the woods and fields and traverse the bogs finds in his own wishes and activities a perennial fountain of joy. While he is making new friends or renewing old acquaintance, he is storing fragrant memories; many a remote woodland spot becomes as clear, to grateful recollection, as his own dwelling; he becomes too full perhaps of reminiscence, but never quite replete with adventure or ready to give over the search.

Fairlee,
Vermont.

PROCEEDINGS OF THE CLUB

April 30, 1919

The meeting was held in the Morphological Laboratory of the New York Botanical Garden. Vice-President Barnhart called the meeting to order at 3:30 P.M. There were fifteen persons present.

The minutes of February 26, March 11, March 25 and April 8 were read and approved. Mrs. Britton, Chairman of the Program Committee made a report. She also asked for authority to call a special meeting on Tuesday, May 15, at 3:30 P.M., to be held at the Mansion of the New York Botanical Garden in cooperation with the Wild Flower Preservation Society of America in order to organize a local chapter and have the Club become an associate member, as Torreya has already been authorized as the organ of the Wild Flower Preservation Society. On motion of Professor Harper the Program Committee was instructed to call a special meeting.

Dr. Howe moved to instruct the Treasurer to donate to the University of Louvain through Columbia University such of the Club's publications as are available.

Mrs. Britton exhibited a plant of *Sisyrhynchium bermudiana*, grown at the New York Botanical Garden from a plant collected in Bermuda, and called attention to the fact that the color had a definite tone, much less blue than any of our native species.

The announced scientific program consisted of a paper on "The Scrophulariaceae of the Local Flora," by Dr. F. W. Pennell. An abstract furnished by the speaker follows:

An account was given of the species of Scrophulariaceae occurring within the local flora range of the Torrey and of the Philadelphia Botanical Clubs. Comment was made of specific characteristics and of distribution. Within this area there are native: 40 species belonging to 19 genera; introduced: 24 species belonging to 7 genera—in all 64 species and 22 genera.

A key proposing a more evolutionary sequence of genera was here first presented. This with a summary of the species it is proposed to publish in forthcoming numbers of Torreya. Specimens were shown illustrating all species of the area.

May 13, 1919

The Club met at the American Museum of Natural History. President Richards called the meeting to order at 8:15 P.M. There were twenty persons present.

Dr. F. W. Pennell, chairman of the Field Committee, discussed the proposal to announce a joint field excursion with the Philadelphia Botanical Club to Farmingdale, N. J., on May 30. He proposed to make the excursion a one-day trip with the provision that anyone wishing to stay over could do so. The motion to adopt this suggestion was carried.

President Richards announced that the 90th birthday of Capt. J. Donnell Smith would occur in the near future. Dr. Pennell moved to appoint a committee to write a letter of felicitation to Capt. Smith, expressing the Club's appreciation of the memorable work he has done in advancing the knowledge of plants. The President appointed Dr. N. L. Britton, Dr. R. A. Harper and Dr. M. A. Howe, members of the committee to draw up this letter.

No other business was transacted.

Dr. Isaac Levin gave the lecture of the evening, "Neoplastic Diseases (Cancer) in the Animal and vegetable Kingdoms." The lecture was illustrated by lantern slides.

Adjournment followed.

B. O. Dodge,
Secretary.

NEWS ITEMS

Dr. D. S. Johnson of Johns Hopkins University, accompanied by three of his students, has just returned from Jamaica. Collections for morphological work were made in the Blue Mountain region and in Liguanea Plains.

W. H. Blanchard wishes his botanical friends and correspondents to know that, owing to the development of cataracts on both eyes, his botanical work seems at an end. Mr. Blanchard was a frequent contributor to the American botanical press from 1902 to 1911, most of his published work relating to the genus *Rubus* as it occurs in eastern North America; his summary of

his conclusions regarding the species of this genus in that area was published in the *Bulletin of the Torrey Botanical Club* (38: 425–439. 1911.)

Messrs. Barrington Moore, G. P. Burns, C. C. Adams, T. P. Hankinson and Norman Taylor, spent a week in August studying the ecological relations of the plants and animals near the summit of Mt. Marcy in the Adirondacks. This trip was to continue work started during the first week in June by the committee on cooperation of the Ecological Society in America.

One of the most dangerous diseases of Irish potatoes has been discovered in the United States. Rough, spongy outgrowths of varying size are produced on the tubers, especially at the eyes. These warts are light brown at first, but become black and decayed with age. Sometimes all potatoes in affected hills are worthless. The disease does not attack the vines above ground. The wart is caused by a parasitic fungus (*Chrysophlyctis endobiotica* Schilb.), which was named and described by Schilberszky, a Hungarian scientist, in 1896. It is one of the lowest members of the Chytridiaceae, a group of parasites that attack the stems, leaves, and especially the roots of many wild and cultivated plants. Although it belongs in the same great group of fungi as the common bread mold, it produces no mold growth and is so small that it can hardly be seen with the naked eye.

The first volume of *The Cactaceae* by N. L. Britton and J. N. Rose was issued by the Carnegie Institution on June 21. The work will comprise four volumes. The first contains descriptions and illustrations of groups allied to *Opuntia* and of the prickly pears themselves, and is one of the most sumptuous botanical publications recently issued. It will be reviewed in an early issue of TORREYA.

TORREYA

Vol. 19 — September, 1919 — No. 9

SCROPHULARIACEAE OF THE LOCAL FLORA. III

By Francis W. Pennell

(*Continued from August* Torreya)

11. Veronicastrum Heister; Fabr. Enum. meth. pl. Hort. Helmstead. 111. 1759

Type species, *Veronica virginica* L.

1. Veronicastrum virginicum (L.) Farwell.

Veronica virginica L. Sp. Pl. 9. 1753. "Habitat in Virginia." Grown in the Clifford garden.

Veronicastrum album Moench, Meth. 437. 1794. "...... .... *Veronica virginica* L."

Calistachya alba Raf. in Med. Repos. N. Y. II. Hex. 5: 352. 1808.

Based on *Veronica virginica* L. Type of *Calistachya* Raf., not *Callistachys* Vent., 1804.

Leptandra virginica (L.) Nutt. Gen. N. Am. Pl. **1**: 7. 1818. Type of *Leptandra* Nutt.

Eustachya alba (Raf.) Raf., Cat. 14. 1824. *Eustachya* Raf. in Am. Mo. Mag. 4: 190. 1819, was a new name for *Calistachya* Raf. Preoccupied by *Eustachys* Desv., 1810.

Leptandra alba Raf. Med. Fl. **2**: 21. 1830. "The true *V. virginica* of L. .... The most common species being found all over the United States."

Paederota virginica (L.) Torr., Fl. N. Y. **2**: 44. 1843.

Calistachya virginica (L.) Farwell in Mich. Acad. Sci. Rep. **17**: 176. 1915.

Veronicastrum virginicum (L.) Farwell, Drugg. Circ. **61**: 231. 1917.

[No. 8, Vol. 19, of Torreya, comprising pp. 143–159, was issued Sept. 17, 1919]

Varying, in number of leaves in whorl (five, reducing to four or three), in inflorescence of one or several racemes, and in leaves from lanceolate to nearly ovate, pubescent to nearly or quite glabrous beneath.

Flowering from mid-July to early September, and soon ripening fruit.

Sandy or loam soil, swales and moist meadows, in potassic, magnesian and calcareous soils, frequent above the Fall-line; in western Long Island, and occasional in Middle district of New Jersey. Ranges from Connecticut and Ontario to Mississippi, Minnesota and Texas.

Veronica L. Sp. Pl. 9. 1753

Type species, *Veronica officinalis* L., of Europe.

Flowers solitary, axillary, frequently approximating so as to form a terminal raceme. Leaves alternate through the inflorescence.

- Filaments not exceeding the lobes of the corolla. Bracts leaf-like or slightly reduced. Plants less than 3 dm. tall.
  - Pedicels longer than the sepals, usually exceeding the bracts. Sepals ovate. Capsule turgid. Seeds few, 1.3–3 mm. long, convex-arched, roughened. Leaves petioled (rarely the uppermost sessile), primarily palmately 5–7 nerved, the midvein usually with some radiating pinnate veins; mainly alternate, the lower sometimes opposite.
    - Leaves broadly cordate, 3–5 lobed, the lobes rounded. Sepals broadly ovate, conspicuously ciliate. Capsule very turgid, scarcely notched at apex, only slightly 2-lobed. Seeds 2.5–3 mm. long, blackish. — 1. *V. hederaefolia.*
    - Leaves ovate, serrate to dentate. Sepals more shortly ciliate. Capsule slightly flattened, deeply notched at apex, thus strongly two-lobed. Seeds 1.3–1.5 mm. long, brown.
      - Petals not exceeding the ovate sepals. Capsule-lobes rounded, the most distal point of each about midway between the style and the lateral margin. — 2. *V. agrestis.*

Petals exceeding the narrowly ovate sepals. Capsule-lobes acutish, the most distal point of each near the lateral margin. 3. *V. Tournefortii.*

Pedicels shorter than sepals or bracts. Sepals linear to narrowly ovate. Capsules flattened. Seeds many, less than 1 mm. long, flat, smooth or nearly so. Leaves sessile (or the lower petioled), scarcely palmate; alternate only through the inflorescence.

Perennials. Repent, with ascending stems. Leaves oval or ovate, obscurely crenate. Inflorescence spike-like, restricted to the distal portion of the stem. Sepals ovate. Corolla blue or white, with deep-blue lines on posterior side. Capsule retuse or shallowly notched, glandular-pubescent.

Leaves prevailingly oval. Stems distally and pedicels minutely pubescent with appressed hairs. Corolla 2 mm. long, white, with blue lines on posterior side. 4. *V. serpyllifolia.*

Leaves prevailingly ovate. Stems distally and pedicels finely pubescent with mostly spreading hairs. Corolla 3 mm. long, blue on posterior side, anterior lobe nearly white; with deep-blue lines on posterior side. 5. *V. ruderalis.*

Annuals. Erect, much branched below. Most leaf-axils flower-bearing. Sepals lanceolate to linear. Capsule deeply notched.

Lower stem-leaves ovate, crenate-serrate, the lowermost frequently petioled. Corolla deep violet-blue. Capsule pubescent with slightly gland-tipped hairs. Plant pubescent with glandless hairs. 6. *V. arvensis.*

Lower stem-leaves oblanceolate, entire or distally remotely toothed, all sessile. Corolla whitish throughout. Capsule glabrous. Plant glabrous or with short gland-tipped hairs.

Stem glabrous. 7. *V. peregrina.*

Stem pubescent with gland-tipped hairs. *7a. V. peregrina xalapensis.*

Filaments much exceeding the lobes of the corolla.

Bracts linear, abruptly reduced from the lanceolate foliage-leaves. Plants 6–10 dm. tall. Perennial. 8. *V. longifolia.*

Flowers all in axillary small-bracted racemes. Leaves opposite throughout. Perennials.

Stem, pedicels, leaves and sepals pubescent. Capsules pubescent. Leaves oval or ovate, serrate to dentate. Plants of dry soil.

Leaves sessile or nearly so, ovate, dentate, the largest cordate at base. Sepals 4–5 mm. long, linear-lanceolate, exceeding the capsule. Capsule not glandular, its lobes broadly rounded. Ascending or erect.

Stem erect, 3–5 dm. tall. Leaves coarsely dentate. Racemes 30–60 flowered, the pedicels scarcely exceeding the bracts. Largest corolla-lobes ovate, 6 mm. long, violet. 9. *V. Teucrium.*

Stem ascending, 1–3 dm. tall. Leaves crenately dentate. Racemes 10–20 flowered, the pedicels much exceeding their bracts. Largest corolla-lobes nearly orbicular, 3.5–4 mm. long, violet-blue. 10. *V. Chamaedrys.*

Leaves oval, crenate-serrate, narrowed to a petiolar base. Sepals 2–3 mm. long, lanceolate, shorter than the capsule. Capsule glandular, the most distal point being near the lateral margin of each lobe. Extensively repent, at apex ascending. 11. *V. officinalis.*

Stem, pedicels, leaves and cepals glabrous (or in *V. glandifera* slightly pubescent with gland-tipped hairs). Capsules glabrous. Leaves oblong-ovate to linear, obscurely crenate-serrate to entire. Aquatics.

Capsule scarcely or not wider than long, and scarcely or not two-lobed. Sepals equaling the capsule. Leaves oblong-ovate to broadly lanceolate, obscurely crenate-serrate.

Leaves all petioled. Racemes usually 10–25 flowered. Plant emersed. 12. *V. americana.*

Leaves sessile and clasping (or only the upper or lowermost petioled). Ra-

cemes usually longer, 25–50 flowered. In deeper water, usually mostly submersed.

Stem distally, rachis and pedicels glabrous. Leaves oblong-ovate, mostly broadest about the middle, the lowest, especially if submersed, narrowing to a petiolar base. Capsule globose-ovoid, not or scarcely emarginate. 13. *V. Brittonii.*

Stem distally, rachis and pedicels sparsely pubescent with glands, borne upon jointed stalks. Leaves lanceolate, broadest near the base, the lowest submersed ones elongated-lanceolate, clasping. Capsule broad-globose, emarginate. 14. *V. glandifera.*

Capsule much wider than long, strongly two-lobed. Sepals shorter than the capsule. Leaves linear or nearly so, remotely setaceous-toothed to entire. 15. *V. scutellata.*

1. VERONICA HEDERAEFOLIA L.

Occasionally introduced into waste ands, mostly near cities. From Eurasia.

2. VERONICA AGRESTIS L.

Occasionally introduced into waste land, mostly near cities. From Eurasia.

3. VERONICA TOURNEFORTII C. C. Gmel.

Veronica precox Raf. Atl. Journ. 79. 1832. "Grown in the [Bartram's Botanic] Garden [near Philadelphia] from seeds received from a place unknown; but has spread all over the garden like a weed, and even is become spontaneous on the banks of the Schuylkill." Not *V. praecox* All., 1789.

Veronica diffusa Raf., New Fl. Am. 4: 38. 1838. "Native of ——— naturalized on the Schuylkill near Philadelphia." Re-naming of *V. precox* Raf.

Occasionally introduced into waste land. From Eurasia.

4. VERONICA SERPYLLIFOLIA L.

Common in moist grassy soil, meadows, fields and lawns. From Eurasia.

5. Veronica ruderalis Vahl, Enum. Pl. **1**: 66. 1805. "Habitat in ruderatis versuris et humidis locis frigidis Peruviae." Type not seen nor verified, but specimens from Ecuador and those collected by the writer in Colombia show the identity of this with the plant here considered.

This is the plant identified in the seventh edition of Grays Manual as *Veronica humifusa* Dickson. This species, published in Trans. Linn. Soc. **2**: 288. 1794, and found by James Dickson on "very high mountains of Scotland," was described by him as a plant wholly prostrate, with cordate-subrotund minutely scabrous leaves which often occur in threes or fours, and with a short raceme of a few crowded flowers. Whatever this may be, it surely cannot be our plant.

Veronica ruderalis appears to be the most cosmopolitan species of the genus, and doubtless *V. serpyllifolia* must be considered as a Palaearctic derivative from it. It is a boreal or mountain species through Eurasia and the Americas. One European description which I have had no opportunity to see, that of *Veronica neglecta* F. W. Schmidt, Fl. Boem. **1**: **12**. 1794, may give a name which possibly must supersede ours. This is identified by Koch, Syn. Fl. Germ. & Helv. 529. 1837, as a larger ovate-leaved form of *V. serpyllifolia*. However in the fifth (Hallier's) edition of the Flora von Deutschland of Schlechtendahl and Others, **17**: 150, while this is similarly characterized, the glandular-pubescent plant is distinguished as var. *borealis* Laestad. So it would appear safer to consider *neglecta* as but a robust state of the appressed-pubescent *serpyllifolia*.

I agree with Prof. Fernald, in Rhodora **4**: 194. 1902, that "the evidence at hand indicates that this large-flowered variety is the only indigenous form of *V. serpyllifolia* in Northeastern America." I follow his later judgment as expressed in the Grays New Manual, and in Rhodora **13**: 124. 1911, in according this specific rank. However I see no basis for the decision of the new Gray that *serpyllifolia* is likewise indigenous. Its occurrence in North America is south of the region normally occupied by species common to both this continent and Europe.

Apparently this has been collected in our range by *C. F.*

Austin in Sullivan Co., New York in 1860. It was labeled by him "large form."

6. Veronica arvensis L.

Common in cultivated soil. From Eurasia.

7. Veronica peregrina L. Sp. Pl. 14. 1753. "Habitat in Europae hortis, arvisque." Described, as the specific name would suggest, from specimens of an introduced plant.

Certainly American in origin, but it is difficult or impossible to say of what portion of this hemisphere it is indigenous. An abundant weed in moist cultivated soil.

7a. **Veronica peregrina xalapensis** (H. B. K.) Pennell, comb. nov.

Veronica xalapensis H. B. K., Nov. Gen. et Sp. **2**: 389. 1817. "Crescit in Regno Mexicano prope Xalapa (alt. 630 hex.), in nemoribus Liquidambaris Styracifluae."

Occasional in cultivated soil. In the western half of the continent this glandular-pubescent plant completely replaces true *peregrina*. In the east it is only occasionally seen, and that probably as an introduction. Intergradation to the species seems to be complete.

8. Veronica longifolia L.

Rare in waste land. From Eurasia.

9. Veronica Teucrium L.

Rare in grass or waste land. From Eurasia.

10. Veronica Chamaedrys L.

Occasional in grass land. From Eurasia.

11. Veronica officinalis L.

Common in pasture fields and waste lands. In colonial times this was grown as a medicinal plant, and very early became established as if native. From Eurasia.

12. Veronica americana Schwein.

Veronica Beccabunga americana Raf., Med. Fl. **2**: 109. 1830. "It grows from Canada to Virginia and Kentucky, near water, brooks, &c."

Veronica americana Schwein.; Benth. in DC., Prod. **10**: 468. 1846. "*Veronica americana* (Schweinitz! mss.)

· · · . In America boreali a Canada et Carolina usque ad flum. Oregon et in ins. Sitcha · · · (v. s.)" Specimen seen in herbarium of the Academy of Natural Sciences of Philadelphia, labeled "Bethl." [Bethlehem, Pennsylvania], collected by Schweinitz, may be of collection seen by Bentham.

Flowering from late May to mid-August, and soon ripening fruit.

Springheads in woodland, and along cool streams, in potassic soil, frequent throughout the area above the Fall-line; in northern and westernmost Long Island. Ranges from Quebec to Alaska, south to South Carolina, New Mexico and California.

13. **Veronica Brittonii** PORTER sp. nov.

Veronica Anagallis latifolia Britton in Bull. Torr. Bot. Club **12**: 49. 1885. "In the latter part of September, 1883, · · · near Mahwah, Bergen Co., New Jersey, I noticed [this] in a small stream which crosses the N. Y. L. E. & W. R. R., half a mile or so north of the station." Type seen in herbarium of Columbia University at the New York Botanical Garden.

Stem 3–9 dm. long, glabrous, succulent, hollow. Leaves oblong-ovate to oval, acute, crenate-serrate to nearly entire, 5–10 cm. long, 3–5 cm. wide, clasping, the lowest narrowed to a petiolar base. On autumnal shoots all the leaves are ovate and definitely petioled. Racemes axillary to the upper leaves, 6–12 cm. long, 40–60 flowered. Bracts narrowly lanceolate, 4–5 mm. long. Pedicels 3.5–4.5 mm. long, glabrous. Sepals 3–3.5 mm. long, lance-ovate, acute. Corolla 4 mm. long, with a few hairs within throat, pale-blue, paler anteriorly, with longitudinal reddish-violet lines. Capsule 3–3.5 mm. long, globose-ovoid, acutish. Seeds .4 mm. long, oval, yellow-brown.

Type, base of Marble Hill, above Phillipsburg, New Jersey, collected in flower and fruit June 24, 1892, *T. C. Porter*; in herbarium Columbia University at the New York Botanical Garden. This specimen shows the summer state. Specimens collected at the same station October 9, 1892, show excellently the autumnal condition.

In the herbarium of Columbia University is a manuscript

description by Dr. Thomas C. Porter, the diagnosis of which includes such field knowledge as to make it worth quoting in full: "VERONICA BRITTONII, n. sp.

" (*V. Anagallis* L., var. *latifolia* Britton). Glabrous, perennial, growing in shallow, shaded rivulets. In its summer state (June), the stems are erect, simple or branching, 2 to 3 feet high, round, often half an inch in diameter, succulent, fistular, brittle; the leaves ovate or oblong-ovate, variable in size, 2 to 3 inches in length, more or less clasping at base, the lowest pair sometimes contracted into short petioles; racemes numerous, many-flowered. In its autumn-state (October), the stems are procumbent at base and rooting at the joints, rarely producing racemes of flowers; the leaves large, orbicular, 1½ to 2 inches in diameter, abruptly narrowed into broadly margined petioles, ½ to an inch long, shining, thickish when fresh, with prominent veins beneath, thin when dried, crenulate, those of the slender branches similar but much smaller, petioles of the uppermost very short or wanting. Inflorescence, fruit and seeds scarcely to be distinguished from those of *V. Anagallis* and *V. Beccabunga*; flowers pale blue, the three large lobes marked with reddish stripes; capsules orbiculate, acutish." Then follow citation of specimens from northeastern Pennsylvania and northwestern New Jersey, and considerable interesting comment.

From a series of letters of Dr. Porter to Dr. Britton, the history of the former's interest in this plant may be traced. It commenced with finding on October 1, 1891 at Pot Rock, near Easton, Pennsylvania, a colony of the autumnal petioled-leaved form. On the 5th he wrote of having visited a colony of the plant in "the little run beside the tavern above Pot Rock," a station whence in "in midsummer two or three years ago" he had obtained "a very different form." The plant was abundant, and exactly that of the first discovery. On the 12th, Dr. Porter was "fully convinced that this plant is genuine *V. Beccabunga*, L.," and accordingly sent a note for the *Torrey Bulletin* to urge this opinion. He had even convinced himself of its introduction from the Old World. But for us the most interesting paragraph of this note is that contrasting the autumnal state of this plant with *Veronica americana:*

"*Veronica Americana* Schwein., a nearly allied species, which has likewise petioled leaves, was growing with it in some places, but its procumbent, far less robust stems and its smaller, ovate or lance-ovate, sharply serrated leaves furnished a striking contrast. In seeing them thus together even an unpracticed eye could not have failed to distinguish the one from the other. Intermediate forms were wholly wanting, so that the conjecture that it either must be an abnormal growth of that species, or a new variety is wide of the mark."

Flowering from late May to early October, and soon ripening fruit.

"Shallow shaded rivulets," through Piedmont Region above the Fall-line, western Connecticut to Northeastern Pennsylvania; reported by Porter from Franklin County, Pennsylvania, and seen from Keweenaw County, Michigan, collected July 8, 1915 by *O. A. Farwell 4005*.

CONNECTICUT.* Litchfield: North Canaan, *E. B. Harger 6238* (A).

NEW YORK. Greene: New Baltimore, *N. Taylor 1289* (Y). Queens: Flushing, *J. A. Bisky* (E, Y); Jamaica (Y). Rockland: Spring Valley (Y); Tappan, *W. H. Leggett* (Y).

NEW JERSEY. Bergen: Carlstadt (Y); Carlton Hill, *G. V. Nash 244* (Y); Mahwah (Y). Hunterdon: banks of Delaware River above Stockton, *C. S. Williamson* (A). Passaic: Passaic, *E. W. Berry* (Y). (P) Warren: Flatbrookville, (A); Manunka Chunk, Phillipsburg, *T. C. Porter* (A, Y).

PENNSYLVANIA. Northampton: Pot Rock, etc., near Easton, *T. C. Porter* (A, P, Y); Johnsonville (A); Martins Creek (A); Riverton (A).

14. **Veronica glandifera** Pennell sp. nov.

Flowering stem 3–9 dm. long, glabrous or distally glandular-pubescent. Leaves lanceolate, acuminate, more or less serrate,

* Localities for specimens seen are grouped by counties, and these listed in alphabetic sequence.

Herbaria cited: A. Academy of Natural Sciences, Philadelphia.
E. Brooklyn Botanic Garden, Brooklyn.
P. University of Pennsylvania, Philadelphia.
Y. New York Botanical Garden, New York.

7–10 cm. long, 1.2–2.5 cm. wide, all clasping, the lowest submersed ones elongated. Racemes axillary to the upper leaves, 10–20 cm. long, 30–60 flowered. Bracts narrowly lanceolate, 4–6 mm. long. Pedicels 3–6 mm. long, glandular-pubescent with scattered hairs. Sepals 3–4 mm. long, lanceolate, acute to acuminate. Corolla about 3 mm. long, not seen fresh. Capsule 2.5–3 mm. long, 3–3.5 mm. broad, broad-globose, emarginate. Seeds .4 mm. long, oval, yellow-brown.

Type, vicinity of Suffolk, Nansemond County, Virginia, collected in flower and fruit May 27, 1893. *N. L. Britton and J. K. Small:* in herbarium Columbia University at the New York Botanical Garden.

Flowering from late May to late July, and soon ripening fruit.

Shallow flowing streams, mainly in calcareous soil, through the lower Piedmont from the Delaware valley southwestward.* Ranges from New Jersey to North Carolina, Minnesota and Kentucky.

New Jersey. Warren: Warrenville, *C. S. Williamson* (P).

Pennsylvania. Bucks: Rockhill, *A. MacElwee* (A); Sellersville (A). Chester: West Chester, *W. Darlington* (A, Y). Lancaster: Dillerville Swamp, *J. K. Small* (Y). Montgomery: Conshohocken (A); Manayunk, Shannonville *J. Crawford* (A) Philadelphia: East Park (P) *I. C. Martindale* (A). Wayne Junction (A).

15. Veronica scutellata L., Sp. Pl. 12. 1753. "Habitat in Europae inundatis."

Flowering from late May to September, and soon ripening fruit.

Swales and along streams, through the area above the Fall-line, becoming common northward. Ranges from Newfoundland to Yukon, south to Virginia, Wyoming and California; also through Eurasia.

(*To be continued*)

* In the herbarium of the Charleston Museum, Charleston, South Carolina, is a sheet of *glandifera* bearing the inscription "Marl indicator!! Va. M. T." Dr. Barnhart identifies this comment as that of Michael Tuomey, a teacher in Virginia, who afterward became State Geologist of South Carolina. My only finding of this plant has been on limestone at Natural Bridge, Virginia, *Pennell 9802*.

A NEW CUBAN SIDA

By Brother Léon

Sida Brittoni Fr. Léon, sp. nov.

Perennial; stems hirsute-strigose, diffusely branched at the base, prostrate, 3 to 4 dm. long, the branches ascending or prostrate; leaves oblong to elliptic or obovate, rounded at apex, serrate above the middle, 1 to 2 cm. long, 4 to 9 mm. wide, subcordate at base, long-ciliate, hirsute on both surfaces, with long scattered stellate hairs beneath; petioles 4 to 7 mm. long; stipules linear or somewhat spatulate, long-ciliate, little longer than the petioles; flowers clustered at the end of the branches; pedicels shorter than the subtending petioles; calyx 5-lobed, 5 mm. long, its lobes ovate, acute, long-ciliate, slightly longer than the tube, densely hirsute within; petals yellow, about 13 mm. long, puberulent; style-branches 5, red, slender, 4 mm. long; carpels 5, 2.7 mm. long, puberulent, sharply reticulate-wrinkled, 2-pointed at apex, 1-seeded, partially 2-valved; seed 3-angled, 2 mm. long, brown, filling the cavity.

Dry savanna, Chirigota, Pinar del Rio, *Léon & Roca 7466.*

This species was collected by the writer in company with Father Modesto Roca Masden, on August 9, 1917, in the savanna of Chirigota, near Santa Cruz de los Pinos, Pinar del Rio province.* This locality is well known to the botanists who have studied the flora of Cuba, a number of rare plants having been collected there by Charles Wright, who, for several years, had his quarters not very far away, at Retiro, at the foot of the western mountain range.

North of the road which connects Havana with Pinar del Rio, lies the higher and drier portion of the Chirigota savanna. In its gravelly soil more or less mixed with grains of limonite, is growing a palm (*Sabal* sp.) closely related to the palmetto of the southeastern States, and, among lower plants, *Sporobolus indicus* is predominant in many places. In that environment,

* The following specimens from other localities are in the herbarium of The New York Botanical Garden: pine-woods, Herradura (*Earle 748*); royal palm savanna, Herradura (*Britton, Earle & Gager 6342*); coastal plain near Coloma (*Britton & Gager 6996*). The plant is also in the herbarium of Columbia University, as found by *Charles Wright (2046)*, presumably in Pinar del Rio, and this was the collection recorded by Grisebach as *Sida ciliaris* L.—F. W. Pennell.

the plant on which the new species is based attracted our attention by its abundant and hirsute foliage and its relatively large yellow flowers, perhaps the most showy of all Cuban Sidas.

The specimens collected had been at first tentatively referred to *Sida ciliaris* L., many characters being common to both species: Stems prostrate, hirsute-strigose, diffusely branching at base; leaves crenate or serrate above the middle; flowers clustered at the end of branches; long-ciliate linear or spatulate stipules. Remembering how the living plant differed in aspect from *S. ciliaris* I thought it likely to be a distinct species. In fact a more accurate observation revealed a number of distinct characters. At first sight, the mode of branching and the distribution of leaves appear very different; in *S. Brittoni* the numerous stems which branch only near the base and have their nodes approximate, are leafy and nearly simple most of their length, while in *S. ciliaris* the stems, shorter and thinner and with relatively long internodes branch repeatedly throughout and most of the leaves are crowded near the extremites of the branches and around the inflorescence.

Among other differences are the following: *S. Brittoni* has the leaves hirsute on both surfaces, the corolla yellow, the style-branches red and 4 mm. long, the top of the fruit puberulent and sharply reticulate-wrinkled; in *S. ciliaris* the leaves are glabrous on the upper surface and stellate-pubescent beneath, the smaller corolla reddish purple, the style-branches pale yellow, 2 mm. long, the top of the fruit tubercled and stellate-pubescent.

As to the habitat it appears to be also different, *Sida ciliaris* being mostly confined to the sandy or rocky limestone soil of coastal thickets and adjacent hillsides.

This species is named in honor of Dr. Nathaniel Lord Britton, who has contributed so much to the knowledge of the Cuban flora.

Colegio de La Salle,
Vedado, Habana.

A COMPARISON OF THE FLORA OF SOUTHERN BRITISH COLUMBIA WITH THAT OF THE STATE OF WASHINGTON, AS ILLUSTRATED BY THE FLORAS OF HENRY AND PIPER

By James C. Nelson

The Pacific Northwest, by which rather elastic term may be understood the region extending from the northern boundary of California to Prince William Sound, Alaska, and including the present States of Oregon and Washington and the Province of British Columbia, has been a fruitful field for botanical research since the days of Archibald Menzies, and still affords ample opportunity for scientific investigation. Not only does it possess a vast and diversified flora, with many species of restricted range and habitat, but there exists a marked tendency toward variability, indicating that in this geologically recent portion of the continent, the process of evolution is still active also in the plant world, and affording strong support to the upholders of the "mutation" theory. As a result of this tendency to variation, the limits of many species are not yet defined, and the relatively few students of the native flora have found themselves unable to cover the field adequately, so that anything like a comprehensive treatment of the flora of the entire region has not yet appeared. The rapid introduction of foreign species, which find in our genial climate and fertile soil conditions almost ideal for their speedy naturalization, still further complicates the situation. The Flora of Howell, that indefatigable pioneer, whose lack of scientific training was compensated for by a boundless enthusiasm and a keen and accurate power of observation, has now become almost obsolete, so that the present-day student of the Northwest flora is compelled to have recourse to a comparatively scanty list of local manuals, of very uneven scientific merit. It is a matter for congratulation therefore that Professor Henry has given to the scientific world in his recent manual*

* Henry, Joseph Kaye. Flora of Southern British Columbia and Vancouver Island. Toronto: W. J. Gage & Co. Ltd. 1915. Pp. 363. $1.00.

the result of his long and careful study of the Northwest flora. The book has been adopted for use by the schools of the Province, and in fact grew out of Professor Henry's desire to provide for youthful students of the local flora a guide such as in his own youth he was unable to secure. The limitations of a school text have of course made it impossible for him to enter into technical taxonomic discussions, to give detailed statements of geographical range, or to confirm the included species by lists of specimens examined; but the descriptions are full and accurate, the keys carefully constructed, and a considerable number of new species and varieties are added to those already known to exist.

The author displays a sound and sane conservatism, and has not looked with favor on the minuter classification of the North American Flora. The tendency toward excessive subdivision of genera and multiplication of species has gone very far in the last two decades, and must, to use Professor Henry's words, "soon give place to the broader conception of what the 'lumper' considers constitutes a species." We accordingly find that many recently proposed genera are restored to their original position. *Piperia* and *Limnorchis* are replaced in *Habenaria*, *Batrachium* in *Ranunculus*, *Gormania* in *Sedum*, *Comarum*, *Dasiphora*, *Argentina* and *Drymocallis* in *Potentilla*, *Sieversia* in *Geum*, *Anogra* and *Onagra* in *Oenothera*, *Oxycoccus* in *Vaccinium*, *Harrimanella* in *Cassiope*, *Collomia* in *Gilia*, *Thalesia* in *Orobanche*, *Rapuntium* in *Lobelia*, *Eucephalus* and *Machaeranthera* in *Aster*, and *Ptilocalais* in *Microseris*. Perhaps an excess of conservatism is shown in the return of *Schizonotus* to *Spiraea* and *Navarretia* to *Gilia*; but on the whole the tendency is toward a thoroughly sane conception of taxonomic relations. This is further illustrated by the refusal to recognize the recent union of Papaveraceae with Fumariaceae and Lobeliaceae with Campanulaceae, or the attempt to segregate Rosaceae into a group of too-closely related families. The nomenclature is throughout that of the International Rules, in strong contrast to the prevailing tendency among Western botanists to adopt the provincialities of the so-called "American" Code. While the Rules adopted at Vienna

are far from being adequate, they still represent the only method by which a satisfactory nomenclature can ever be attained, that of *international* agreement: and the attempt of any nation to herd by itself in these matters cannot hope for any greater success than the proposal of the "free-silverites" in the matter of a monetary standard.

Perhaps a more just estimate of the scope and value of Professor Henry's work may be attained by comparing it with another manual covering an adjacent field. In 1906 Professor C. V. Piper published a Flora of Washington (Contr. U. S. Nat. Herb., Vol. XI), which still remains in many ways a model of scientific accuracy and thoroughness. Since Washington adjoins British Columbia on the south, considerable resemblance between the floras of the two regions would be expected, and the majority of the species mentioned in the one manual might with reason be looked for in the other.

A glance at the map, however, will show that this expectation of similarity must not be carried too far. Washington extends 240 miles south of British Columbia; and no tendency in plant-distribution is more marked than the increase in the number of species away from the arctic regions and toward the tropics. The distinctively Californian flora which extends northward through Oregon and into Washington with a steadily diminishing number of representatives, seems to have reached its northernmost limit, in the case of the vast majority of species, in the neighborhood of a boundary which coincides more or less roughly with that of southern British Columbia. What may be termed the Alaskan or sub-arctic flora in like manner seems to have reached the limits within which it may be called dominant somewhere north of the 49th parallel; and although many of its members continue southward in the Rockies, this region lies too far eastward of the eastern boundary of Washington to have much influence on the flora of that state.

The exact limits of Henry's manual are not very clearly defined to the northward. In his own words, "The region covered is mainly the southern part of the province extending from Vancouver Island to the Rockies, with a rather indefinite northern

limit, to about the Skeena." Since the valley of the Skeena, with its embouchure at Prince Rupert in latitude 54°, does not cross the entire breadth of the Province, but is replaced on the eastern slope by the valley of the Peace and its tributaries, it becomes somewhat difficult to fix an exact northern limit. But in any case the territory covered by this manual cannot be less than twice as large as the State of Washington, and extends far enough to the east to take in the entire western slope of the Rocky Mountain region, which lies far to the eastward of any part of the State of Washington, so that the casual observer would not unreasonably assume that of the two Floras, Henry's would surpass Piper's in the total number of species. But over against this hasty generalization must be set the fact, not only of the steady increase of species from the poles toward the equator, but the further consideration that the Upper Sonoran Zone, which dominates the semi-arid portion of eastern Washington, and which is remarkably rich in number of species, is very scantily represented in the Province, extending but a short distance into the central plateau along the valley of the Okanogan. More than this, Washington is characterized by an endemism that is far less marked in the part of British Columbia under consideration. The number of species that have been reported from their type-locality only is surprisingly large; the Olympics, the Wenatchee Mountains, and Mount Rainier are all characterized by a strongly local flora; and the general region of the Columbia Gorge, including the greater part of the Columbia Valley from the Great Falls at Celilo to the sharp northward bend of the river at Pasco, contains a surprisingly large number of species with a very restricted local range. No such marked tendency to endemism seems to be displayed in any part of British Columbia. While the flora of Vancouver Island is perhaps the richest in species of local occurrence, and while there is a well-defined succession of botanical areas as we advance eastward from the region of coast forest into the dry interior, and then through a second humid belt to the subalpine and alpine Rocky Mountain zones, the fact remains that the tendency to diversity is less marked in British Columbia than in Washington.

We must not be surprised therefore to find that while the total number of species, varieties and named forms included in Henry's Flora is 2,359, the total enumerated by Piper reaches 2,511. Of this number, allowing for differences in nomenclature and in the views held by the two authors regarding specific limits, and excluding 28 of Henry's species that are definitely rejected by Piper, there are common to both manuals 1,517 named forms: in other words, at least 60 per cent of all the species mentioned are common to both districts.

In Henry's Flora there are 764 species and forms not mentioned by Piper; in Piper's Flora 928 not mentioned by Henry. Doubtless if the present reviewer were thoroughly conversant with the taxonomic history and bibliography of all these forms, it would be possible to reduce these figures materially by detecting identity in names that seem wholly unrelated; but neither his knowledge nor the resources at his command permit such an undertaking.

Retaining the above totals therefore, a few remarks may be offered on the species which appear in but one of the two manuals. In presenting these observations, the reviewer must presume that both authors have covered their territory with equal thoroughness. In Professor Piper's Flora, the author has appended to each species a full list of "Specimens Examined," so that it is possible to confirm very definitely each and every one; but the scope of a school text-book has not permitted Professor Henry to do this, so that a full confirmation of his species cannot be attained.

Assuming therefore that the 764 species mentioned only by Henry are all essentially different from any forms included by Piper, and that their existence within his territory can be definitely confirmed, we find that they can be grouped approximately as follows:

Two hundred and ninety-six belong to the Rocky Mountain flora, of which at least 40 may also be regarded as Alaskan, and 21 occur also on Vancouver Island; 130 are distinctly Vancouver Island species, including the 21 found also in the Rockies and 12 which are also Alaskan; 123 may be regarded as Alaskan, in-

cluding the 40 which occur also in the Rockies and the 12 also on Vancouver Island; 52 species, judging from the localities indicated, are purely local (doubtless in many cases an unwarranted assumption); 11 are mentioned without definite locality or range; 111 are introduced species, of which 48 are personally known to the reviewer as occurring in Oregon, and therefore to be expected in the intervening territory of Washington: 50 are included and assigned to definite Washington stations in the two recent manuals by Piper and Beattie, the Flora of Southeastern Washington and Adjacent Idaho (1914) and the Flora of the Northwest Coast (1915). Several others of Henry's species appear in the last-named work, but assigned only to Canadian stations.

In addition to the above, there are 57 species which are given a range by Henry that either explicitly refers them to Washington, or brings them so near the border that it would seem reasonable to expect them on the other side, but which find no mention in Piper's Flora or the two later works of which he is joint author. This comparatively small margin of discrepancy would be doubtless further reduced by a wider knowledge of the specific and varietal limits of these forms, and a more thorough exploration of the territory.

Turning now to the reverse side of the comparison, and examing the 928 forms included by Piper but not mentioned by Henry, we find that they fall into several clearly-defined groups. Beginning with those of the most restricted range and proceeding outward, we may roughly group them as follows:

1. Species that have been reported from the type-locality only, 67.

2. Species that belong to regions of marked endemism, without being restricted to the original station:

In the Olympics, 15
On Mount Rainier, 8
In the Wenatchee Mountains, 21
In the Columbia Gorge and
Klickitat County, 96.

3. Species occurring only in Washington, without restriction to one of the above regions, 107.

4. Species not occurring south of Washington, but with an eastern range, to Idaho, Montana, Colorado, etc., 72.

5. Species occurring in Washington and Oregon only, 114.

6. Species not occurring south of Oregon, but with an eastward range, 67.

7. Species extending from Washington to California, Nevada or Arizona, 364.

Of the above list, 115 are species that are definitely referred by the author to the Upper Sonoran Zone.

The number of these Washington species which are either referred outright to British Columbia in Piper's statement of range, or given a range that would justify us in expecting them in the Province, is 107, of which 19 are introduced. In both manuals therefore, the extreme margin of probable error is not excessive.

A careful study of all these differences and discrepancies leads to two conclusions:

1. That Washington, partly because of the different climatic conditions due to its more southern position, and partly because of its topography, is a region of more marked endemism than British Columbia.

2. That although artificial boundaries are usually wholly without significance in determining plant-distribution, the 49th parallel seems to come very near to a line that marks the extreme northward dominance of the Californian flora on the one hand, and the extreme southern extension of the Alaskan or sub-arctic flora on the other. As far as the introduced plants are concerned, their occurrence or non-occurrence is a matter of very slight significance, since their establishment at any particular station is usually the result of pure accident, and no obstacle to their further spread will usually exist. Some further details of the differences between the two Floras may be of interest.

Fifty-five genera represented in Henry are not found in Piper, but 30 of these include only introduced species (among these *Ulmus* with 3 species, *Dianthus*, *Cynosurus* and *Vinca* with 2 each, and 26 others with one each). *Androsace* with 4 species is the largest indigenous genus not represented in Piper, next come *Limnanthes* and *Primula* with 2 each, and 22 others with one each.

Piper's Flora on the other hand includes 76 genera not mentioned by Henry, of which only 3 (*Syntherisma*, *Dipsacus* and *Cnicus*) are introduced. The largest indigenous genus not represented in Henry is *Sitanion* with 11 species. Next to this is *Capnorea* with 5, *Sphaerostigma* and *Frasera* with 4, *Hemicarpha*, *Horkelia*, *Taraxia* and *Madronella* with 3, and *Parrya*, *Thermopsis*, *Elatine*, *Pachylophus*, *Trichostema* and *Tonella* with 2; 59 other genera are represented by a single species.

The following table represents the discrepancies in the two Floras in the case of a few of the larger genera, particularly of those that reach their widest extension in the Northwest:

	No. Forms in Piper	No. Forms in Henry	No. Common	Piper Only	Henry Only
Poa	33	27	18	15	9
Carex	108	140	61	52	65
Juncus	33	31	24	10	7
Salix	23	39	18	7	21
Eriogonum	28	10	6	23	4
Polygonum	34	30	24	12	6
Ranunculus	30	34	21	9	13
Arabis	20	12	10	10	2
Saxifraga	18	32	12	7	20
Potentilla	29	28	18	8	10
Lupinus	35	22	15	20	7
Astragalus	33	19	13	20	6
Viola	20	23	15	6	8
Lomatium	23	11	9	15	2
Pentstemon	27	12	10	17	2
Aster	32	27	16	16	11
Erigeron	25	37	18	8	19
Senecio	31	32	17	14	15

These figures seem to show that in genera with a predominantly *northern* range, Henry's total of local species will exceed Piper's; while in those with a *southern* range the converse will be true. In the case of *Carex*, about all that seems to be illustrated is the fact that neither author had been able to make an exhaustive study of the genus or arrive at any clear understanding of its species. It is to be hoped that the much-needed clearing-up of this difficult problem will be attained by the careful work which K. K. Mackenzie is now doing on the genus. In matters of form and technique, which with a few notable exceptions remain the weak point of American authors, the reviewer re-

grets to note considerable carelessness in Professor Henry's book. He announces in his preface his intention of capitalizing only "some old Linnean generic names still retained for species and those derived from the names of persons"; but on the one hand we find him writing *Italica, Monspeliensis, Major, Sibiricum, Beeringianum, Andina, Davuricum, Moschatus*, and on the other *convolvulus, paronychia, cymbalaria, aquifolium, malus, parthenium* as specific names.

Occasionally he overlooks the fact that under the International Rules trinomials are not written without an indication of the category of the third member, as subspecies, variety or forma, and we read *Populus nigra Italica, Anemone patens Wolfgangiana.* In general, however, the subdivisions of species are more clearly differentiated than in Piper, whose disposition to regard the terms "subspecies" and "variety" as identical has led to much confusion. But Henry does not always avoid the absurdity of identical binomials, as *Phegopteris phegopteris, Hypopitys hypopitys* (misspelled in the text). Failures in grammatical agreement are far too common, such as: *Equisetum arvensis, Equisetum variegatum* var. *Alaskana, Pleuropogon refractum* (an error to which most Western writers stubbornly cling), *Cypripedium parviflora, Gormania oreganum, Sedum rosea, Rubus viburnifolia, Geum humilis, Acer circinatum* var. *fulva, Malva moschatus, Phyllodoce glanduliflorus, Mimulus Lewisii* var. *alba, Mimulus Langsdorfii* var. *minima, Symphoricarpos racemosa, Aster Lindleyana, Erigeron membranaceum, Agoseris villosum.*

This carelessness is the more regrettable, since several of these blunders are found in the case of new species and varieties proposed by the author!

Orthographical blunders are so common as to make us wonder whether the author read his proof at all. In the case of generic names we are compelled to read: *Hordum, Commandra, Hesperus, Hypopites, Asperuga, Eriganum, Seriocarpus*: and in specific names: *Poa Fenderiana, Papaver sominferum, Alyssum alysoides, Cakile edulenta, Philadelphus Lewesii, Boykinia circinnata, Potentilla monspielensis, Cymopterus terebinthus, Boschniakia strobiliacea, Campanula rotundifolia* var. *petiotala, Xanthium*

candense and *Coreopsis Atkinsonia.* The name of the Water-Lily Family is spelled Nymphaceae. Trelease's name appears as "Trealease," Betcke's as "Betche," and Moquin is abbreviated "Mog."

In this matter of abbreviations the author seems to have proceeded on the theory that variety is the spice of life, and along with the accepted forms he occasionally treats us to the following: Haus. for Haussknecht, Bick. for Bicknell, Wat. for Watson, Par. for Parlatore, Mich. for Michaux (wholly forgetting that this abbreviation belongs to Micheli), Scrib. for Scribner, Mer. for, Merrill, Thur. for Thurber, Vil. for Villars, Buck. for Buckley, Hitch. and Hitche. for Hitchcock, Brit. for Britton, Beuth. for Bentham, Fer. for Fernald, Englem. for Engelmann, Ren. for Rendle, Walle. and Walls. for Wallroth.

Often the abbreviation is written without the period, as if it were the full name, as Rosen, Lindl, Schrad, Bickn, Led, Hook, Kaulf, Lamb, . . . On the other hand, full names are frequently written as if abbreviations (Hoppe., Presl., Morong.). Presl also appears as Prisl and Wiegand as Weigand.

The authority for species is often omitted entirely, as in the case of

Polygonum Nuttallii,	which	should be	assigned to	Small
Polygonum minimum	"	"	"	Watson
Myosurus minimus	"	"	"	Linnaeus
Onobrychis sativa	"	"	"	Lamarck
Papaver somniferum	"	"	"	Linnaeus
Medicago arabica	"	"	"	Hudson
Erigeron filifolius	"	"	"	(Hooker) Nuttall

Citations of authorities are frequently incorrect.

Puccinellia angustata (R. Br.) R. & R. should be (R. Br.) Nash.

Lysichiton kamtschatcense Schott should be (L.) Schott.

Corylus californica Rose should be (A.DC.) Rose.

Sagina occidentalis Green [sic] should be Wats.

Vancouveria hexandra M. &. C. should be (Hook.) Morr. & Dec.

Athysanus pusillus Greene should be (Hook.) Greene.
Cytisus scoparius Link should be (L.) Link.
Circaea pacifica Arch. [sic] should be Aschers. & Magn.
Valerianella samolifolia Haeck. should be (DC.) A. Gray.
Chrysopsis villosa Nutt. should be (Pursh) Nutt.

Such miscellaneous inaccuracies as "Fallarone Is." for Farallone: "L. Her." for L'Her. and "D. C." for DC. are also encountered. The species *Montia parviflora* appears twice, and *M. parvifolia* as a consequence wholly disappears. After *Epipactis*, "R.BR." is written where the common name is usually given. Elsewhere authors of genera have not been cited.

A praiseworthy attempt has been made to indicate the derivation of generic names; but 141 genera are left unexplained, and in the case of others such absurd blunders as *Peramium* from "*per*, through, *amium*, love, in allusion to medicinal properties" (no such word as "amium" exists in the Latin language), *Humulus*, "dim. of *humus*, the ground, because sometimes prostrate" (the root is Teutonic, and has no relation to the Latin *humus*) and *Malvastrum* from "*Malva* and *aster*, a star" (when it is simply the contemptuous diminutive) are perpetuated, evidently all borrowed from Frye and Rigg's Northwest Flora, which as a masterpiece of etymological inaccuracy can hardly be surpassed. Nuttall and Pursh are hardly to be regarded as "English" botanists, when their period of greatest scientific activity was spent in the United States.

In spite of these regrettable defects of form, however, the impression left by Professor Henry's book is, that it is a praiseworthy and valuable effort to contribute to the fuller knowledge of the Northwest flora, and that the work has been surprisingly well done considering that the author makes no claims to being a professional botanist. It is only by such local studies that a full understanding of the fascinating but difficult flora of the Northwest can ever be reached; and it is to be hoped that at some future time Professor Henry may shake off the limitations imposed by a school text, and revise his manual in strictly scientific form.

Salem, Oregon

NEWS ITEMS

Mr. A. O. Garrett, head of the department of Botany, Salt Lake High School, had an appointment and worked as Field Assistant in the Blister Rust Control during the past summer.

During the early part of the year Mr. Joseph F. Rock's Monographic Study of the Hawaiian Lobelioideae, a splendidly illustrated quarto volume, was issued by the Bernice Pauahi Bishop Museum, Honolulu.

The United States National Museum has just issued as volume 21 of its *Contributions* a Flora of the District of Columbia by A. S. Hitchcock and Paul C. Standley. The authors had the assistance of the botanists of Washington in the undertaking. Over 1600 species and 649 genera are noted in the book, which treats of the species growing in the District and their distribution.

Mr. Camillo Schneider, after spending several years in this country and naming the willow collections in most of the larger herbaria of the country, sailed for Vienna on September 3.

Dr. Carl Skottsberg has assumed the directorship of the new botanical garden at Göteborg, Sweden.

TORREYA

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NOTES ON THE GRASSES OF HOWELL'S FLORA OF NORTHWEST AMERICA

By James C. Nelson

Every student who makes a serious attempt to become familiar with the flora of Washington or Oregon, must acknowledge his obligation to the great work of Thomas Howell. The adjective is used advisedly. When we take into account the author's lack of scientific training, the very limited herbarium and library resources at his command, the scarcity of congenial associates, and the constant financial burdens under which he labored, and then observe the total of species and forms which he was able to recognize, the number of new species which he published, the keenness of his observation and the soundness of his critical judgment, we can hardly avoid the conclusion that here was a scientist who with better preparation and under a more favorable environment would have been worthy of rank with John Torrey or Asa Gray. With all its inevitable defects, his Flora must remain a land-mark in the history of Western botany, and the essential soundness of his fundamental conclusions is being vindicated daily. Nor do we detract in any way from the value of his work, or cast any aspersion on his scientific conscience, when we venture to point out that the Flora has from the beginning been in need of revision, and has in many respects become almost obsolete since its publication in 1893. Howell himself, had he lived, would have taken full account of the advances in botanical knowledge, and would have been the first to suggest a revision of his Flora.

In the course of an attempt to become familiar with the grasses of Oregon, particularly of that part of the state included in the

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Willamette Valley, the present writer has found it necessary to make the following notes on the Gramineae (pp. 713–781) in his interleaved copy of Howell's Flora:

I. Species Not Included which have Since been found in Various Localities in Oregon

1. *Paspalum dilatatum* Poir. On ballast at Linnton.
2. *Panicum barbinode* Trin. With the last.
3. *Panicum pacificum* Hitchc. & Chase. On gravelly prairies and along streams throughout the Willamette Valley.
4. *Panicum thermale* Boland. On rocky shore of Rogue River near Agness, Curry County.
5. *Panicum miliaceum* L. On rubbish-heaps about Salem.
6. *Digitaria humifusa* Pers. On sand-bars in the Willamette River, and beginning to appear on lawns in Salem.
7. *Phalaris minor* Retz. On ballast at Linnton.
8. *Phalaris paradoxa* L. var. *praemorsa* Coss. & Dur. With the last.
9. *Phalaris brachystachys* Link. With the last.
10. *Cenchrus carolinianus* Walt. With the last.
11. *Setaria imberbis* Poir. With the last.
12. *Anthoxanthum Puelii* Lecoq & Lamotte. Not uncommon in dry, especially alkaline, soil throughout the Willamette Valley.
13. *Agrostis pallens* Trin. On sand-dunes along the coast.
14. *Agrostis alba* L. var. *maritima* (Lam.) Mey. Common on sand-dunes and in salt-marshes along the coast.
15. *Cynodon Dactylon* L. On ballast at Linnton, and beginning to appear in cultivated ground about Eugene.
16. *Ammophila arenaria* (L.) Link. On ballast at Linnton.
17. *Apera spica-venti* (L.) Beauv. On a lawn at Salem.
18. *Nassella chilensis* Desv. On ballast at Linnton.
19. *Eleusine tristachya* Kunth. With the last.
20. *Chloris radiata* Sw. With the last.
21. *Stipa littoralis* Phil. With the last.
22. *Stipa Lemmoni* Scribn. var. *Jonesii* Scribn. On dry slopes in southwestern Oregon.

23. *Lepturus incurvatus* Trin. On ballast, Linnton.
24. *Aira capillaris* Host. On sand-bars along the Santiam River, and in cultivated ground at Salem.
25. *Deschampsia holciformis* (Presl) Steud. On dry soil at summit of ocean bluffs on Yaquina Head.
26. *Avena barbata* Brot. Becoming common along the railroad near Salem.
27. *Eragrostis cyperoides* (Thunb.) Beauv. On ballast at Linnton.
28. *Eragrostis Orcuttiana* Vasey. With the last.
29. *Panicularia occidentalis* Piper. Common in ditches in the region about Salem.
30. *Cynosurus cristatus* L. Occasional on lawns at Salem and Eugene. *C. echinatus* L. is reported by Mr. V. R. Bradshaw as spreading rapidly in the vicinity of Eugene.
31. *Poa trivialis* L. Not uncommon in shady places throughout.
32. *Poa alcea* Piper. In rocky woods at Elk Rock, Multnomah County.
33. *Puccinellia paupercula* (Holm) Fern. & Weath. var. *alaskana* (Scribn. & Merr.) Fern. & Weath. Not infrequent in salt-marshes and on sea-beaches along the coast.
34. *Festuca megalura* Nutt. Abundant in dry soil almost everywhere.
35. *Festuca bromoides* L. Common in cultivated ground and along railroads.
36. *Festuca rubra* L. var. *megastachys* Gaudin. Occasional on roadsides.
37. *Scleropoa rigida* Griseb. Around old buildings in the business district of Salem.
38. *Lolium multiflorum* Lam. Abundant in waste and cultivated ground everywhere.
39. *Lolium perenne* L. var. *cristatum* Doell. A single specimen in a wooded ravine near Eola, Polk County.
40. *Agropyron caesium* Presl. Dry soil about light-house on Yaquina Head.
41. *Agropyron junceum* Beauv. On ballast at Linnton.
42. *Agropyron glaucum* R. &. S. With the last.
43. *Agropyron pungens* (Pers.) R. & S. With the last.

II. Species Whose existence in the Territory Does Not Seem to be Confirmed

1. *Panicum capillare* L. Although some of the Oregon forms seem to approach this species, it seems best to refer them to *P. barbipulvinatum* Nash.
2. *Panicum pubescens* Lam.
3. *Panicum dichotomum* L. Both of these seem referable to *P. occidentale* Scribn.
4. *Panicum scoparium* Lam. Evidently *P. Scribnerianum* Nash.
5. *Aristida fasciculata* Torr. Probably *A. bromoides* HBK., and its occurrence very doubtful.
6. *Melica interrupta* Trin. The name seems to be incorrectly applied.
7. *Panicularia fluitans* Kuntze. Probably *P. leptostachya* (Buckl.) Piper.
8. *Poa glauca* Vahl. An introduced species—not confirmed by any later collector.
9. *Festuca heterophylla* Lam. Probably *F. occidentalis* Hook.
10. *Elymus dasystachys* Trin. Apparently not correctly applied.

III. Species whose Taxonomic Limits are now Generally Understood Differently

1. *Panicum sanguinale* L. = *Digitaria sanguinalis* (L.) Scop.
2. *Panicum crus-galli* L. = *Echinochloa crus-galli* (L.) Beauv.
3. *Phalaris amethystina* Trin. = *P. californica* Hook. & Arn.
4. *Sporobolus cuspidatus* Wood = *S. Richardsonii* (Trin.) Merr.
5. *Sporobolus depauperatus* Scribn. = *Muhlenbergia squarrosa* Rydb.
6. *Sporobolus Bolanderi* Vasey = *Poa multnomae* Piper.
7. *Sporobolus gracillimus* Vasey = *Muhlenbergia filiformis* Rydb.
8. *Sporobolus simplex* Scribn. = *Muhlenbergia filiformis* Rydb.
9. *Sporobolus filiformis* Scribn. = *Muhlenbergia filiformis* Rydb.
10. *Agrostis asperifolia* Trin. = *A. exarata* Trin.

11. *Agrostis grandis* Trin. = *A. exarata* Trin.
12. *Agrostis Scouleri* Trin. = *A. exarata* Trin.
13. *Agrostis densiflora* Vasey = *A. glomerata* (Presl) Kunth.
14. *Agrostis verticillata* Vill. = *A. stolonifera* L.
15. *Agrostis tenuiculmis* Nash = *A. idahoensis* Nash.
16. *Agrostis Pringlei* Scribn. = *A. Hallii* Vasey var. *Pringlei* (Scribn.) Hitchc.
17. *Agrostis geminata* Trin. = *A. hyemalis* (Walt.) BSP. var. *geminata* (Trin.) Hitchc.
18. *Agrostis attenuata* Vasey. = *A. oregonensis* Vasey.
19. *Agrostis scabra* Willd. = *A. hyemalis* (Walt.) BSP.
20. *Agrostis varians* Trin. = *A. Rossae* Vasey.
21. *Agrostis virescens* HBK. Probably = *A. ampla* Hitchc.
22. *Gastridium australe* Beauv. = *G. lendigerum* (L.) Gaudin.
23. *Cinna pendula* Trin. = *C. latifolia* (Trev.) *Griseb.*
24. *Calamagrostis lactea* Beal = *C. Langsdorfii* Trin. var. *lactea* (Beal) Kearn.
25. *Spartina cynosuroides* Willd. = *S. Michauxiana* Hitchc.
26. *Stipa Kingii* Boland. = *Oryzopsis Kingii* (Boland.) Beal.
27. *Stipa Bloomeri* Boland. = *Oryzopsis Bloomeri* (Boland.) Ricker.
28. *Stipa oregonensis* Scribn. = *S. occidentalis* Scribn.
29. *Stipa viridua* Trin. = *S. minor* Scribn.
30. *Oryzopsis cuspidata* Vasey = *O. hymenoides* (R. & S.) Ricker.
31. *Alopecurus geniculatus* L. var. *robustus* Vasey = *A. geniculatus* L.
32. *Alopecurus pallescens* Piper = *A. californicus* Vasey.
33. *Avena fatua* L. var. *glabrescens* Coss. = var. *glabrata* Peterm.

*34. *Avena Smithii* Porter = *Melica Smithii* (Porter) Vasey.

35. *Trisetum barbatum* Steud. = *Bromus Trinii* Desv.
36. *Trisetum subspicatum* Beauv. = *T. spicatum* (L.) Richter.
37. *Deschampsia calycina* Presl = *D. danthonioides* (Trin.) Munro.

* Farwell has recently established the genus *Bromelica* for this section of *Melica* (Rhodora 21: 76–78).

38. *Holcus lanatus* L. = *Notholcus lanatus* (L.) Nash.

39. *Eatonia obtusata* Gray = *Sphenopholis obtusata* (Michx.) Scribn.

40. *Eatonia pennsylvanica* Gray = *Sphenopholis pallens* (Spreng.) Scribn.

41. *Melica bulbosa* Geyer = *M. bella* Piper.

*42. *Melica bromoides* Gray and var. *Howellii* Scribn. = *M. Geyeri* Munro.

*43. *Melica Harfordii* Boland. var. *minor* Vasey = subsp. *tenuior* Piper.

*44. *Melica acuminata* Boland. = *M. subulata* (Griseb.) Scribn.

45. *Melica scabrata* Scribn. = *M. spectabilis* Scribn.

46. *Distichlis maritima* Raf. = *D. spicata* (L.) Greene.

47. *Panicularia nervata* Kuntze = *Glyceria elata* Hitchc.

48. *Poa reflexa* Vasey & Scribn. = *P. leptocoma* Trin.

49. *Poa incurva* Scribn. & Williams = *P. Sandbergii* Vasey.

50. *Poa occidentalis* Vasey & Scribn. = *P. nervosa* (Hook.) Vasey.

51. *Poa purpurascens* Vasey = *P. paddensis* Williams.

52. *Poa flava* L. = *P. triflora* Gilib.

53. *Poa invaginata* Scribn. & Williams = *P. gracillima* Vasey.

54. *Poa Buckleyana* Nash and var. *stenophylla* Vasey = *P. scabrella* Benth.

55. *Eragrostis reptans* Nees = *E. hypnoides* (Lam.) BSP.

56. *Festuca microstachys* Nutt. var. *ciliata* Gray = *F. Grayi* (Abrams) Piper.

57. *Festuca microstachys* Nutt. var. *pauciflora* Scribn. & Vasey = *F. reflexa* Buckl.

58. *Festuca denticulata* Beal = *F. subuliflora* Scribn.

59. *Festuca californica* Vasey = *F. aristulata* (Torr.) Shear.

60. *Festuca Jonesii* Vasey = *F. subulata* Trin.

61. *Festuca brevifolia* R. Br. = *F. ovina* L. var. *brachyphylla* (Schultes) Piper.

62. *Festuca ovina* L. var. *polyphylla* Vasey = *F. occidentalis* Hook.

63. *Festuca ovina* L. var. *ingrata* Hack. = *F. idahoensis* Elmer.

64. " " " " *columbiana* Beal = *F. idahoensis* Elmer.

* See note on no. 34 above.

65. *Festuca ovina* L. var. *oregana* Hack. = *F. idahoensis* Elmer.
66. *Festuca scabrella* Torr. = *F. altaica* Trin.
76. *Festuca rubra* L. var. *pubescens* Vasey = var. *Kitaibeliana* (Schultes) Piper.
68. *Festuca rubra* L. var. *littoralis* Vasey = var. *pruinosa* Hack.
69. *Bromus racemosus* L. var. *commutatus* Hook. = *B. commutatus* Schrad.
70. *Bromus hordeaceus* L. var. *glabrescens* Shear = var. *leptostachys* Beck.
71. *Bromus Gussoni* Parl. = *B. villosus* Forsk. and prob. var. *Gussonei* Aschers. & Graebn.
72. *Agropyron divergens* Nees = *A. spicatum* (Pursh) Scribn. & Sm.
73. *Agropyron brevifolium* Scribn. = *A. violaceum* Vasey.
74. *Agropyron Elmeri* Scribn. = *A. lanceolatum* Scribn. & Sm.
75. *Agropyron dasystachyum* [(Hook.) Scribn.] var. *subvillosum* Scribn. & Sm. = *A. subvillosum* (Hook.) Piper.
76. *Hordeum maritimum* With. = *H. geniculatum* All.
77. *Elymus saxicolus* Scribn. & Sm. = *Agropyron flexuosum* (Piper) Piper.
78. *Elymus mollis* Trin. = *E. arenarius* L.
79. *Elymus littoralis* Turcz. = *E. arenicola* Scribn. & Sm.
80. *Sitanion elymoides* Raf. Prob. = *S. Hystrix* (Nutt.) Sm.
81. *Sitanion glaber* J. G. Smith = *S. rigidum* Sm.
82. *Sitanion villosum* J. G. Smith = *S. jubatum* Sm.
83. *Sitanion Leckenbyi* Piper = *S. planifolium* Sm.
84. *Sitanion flexuosum* Piper = *Agropyron flexuosum* (Piper) Piper.
85. *Sitanion Brodiei* Piper = *Elymus canadensis* L.

To assert that all the above changes are accepted as universally valid is simply to assume the existence of a nomenclatorial tribunal whose decisions are everywhere accepted as final. Since a species is not an objective entity but a subjective concept, its limitations must in the end remain a matter of private judgment. Doubtless some modern agrostologists would retain many of Howell's names: but it is believed that the changes suggested above approximate the present consensus of opinion regarding specific limitations.

ROOSEVELT'S NOTES ON BRAZILIAN TREES*

Theodore Roosevelt was admittedly the world's authority on the big game mammals of North America—and he was always greatly interested in birds—but his interest in trees and plants was not so keen. His observation of the fauna, however, did not prevent him from giving a thought to trees, particularly when they were striking or unusual. His book, "Through the Brazilian Wilderness" is full of interesting references to trees.

It was always the dramatic that appealed to Theodore Roosevelt. He was interested in animals because they were full of action. Like Roosevelt himself, they *did* things. Even in his descriptions of trees it is interesting to note that it was their dramatic element and not still charm that usually attracted his attention. For instances, here is a graphic description of parasitic fig-trees engaged in strangling a group of palms. It is a picture of still life, yet it is dramatic:

"In one grove the fig-trees were killing the palms, just as in Africa they kill the sandalwood trees. In the gloom of this grove there were no flowers, no bushes; the air was heavy; the ground was brown with moldering leaves. Almost every palm was serving as a prop for a fig-tree. The fig-trees were in every stage of growth. The youngest ones merely ran up the palms as vines. In the next state the vine had thickened and was sending out shoots, wrapping the palm stem in a deadly hold.

"Some of the shoots were thrown round the stem like the tentacles of an immense cuttlefish. Others looked like claws, that were hooked into every crevice, and round every projection. In the stage beyond this the palm had been killed, and its dead carcass appeared between the big, winding vine trunks; and later the palm had disappeared and the vines had united in a great fig-tree. Water stood in black pools at the foot of the murdered trees, and of the trees that had murdered them. There was something sinister and evil in the dark stillness of the grove; it seemed as if sentient beings had writhed themselves round and were strangling other sentient beings."

Later on he gives a more cheerful picture of tropic vegetation.

"We passed through wonderfully beautiful woods of tall palms, the ouaouaca palm—wawasa palm, as it should be spelled in English. The trunks rose tall and

* It is a pleasure to print this as a contribution to the movement to memorialize our greatest recent American, whose untimely death removed a much needed man of the hour. The Roosevelt Memorial Association of 1 Madison Avenue, New York, has kindly allowed, through the courtesy of Mr. Roosevelt's publishers, the reprinting of these notes on trees collected during the now famous Brazilian Expedition.—Ed.

strong and slender, and the fronds were branches twenty or thirty feet long, with the many long, narrow green blades starting from the midrib at right angles in pairs. Round the ponds stood stately burity palms, rising like huge columns with great branches that looked like fans, as the long, stiff blades radiated from the end of the midrib. One tree was gorgeous with the brilliant hues of a flock of party-colored macaws. Green parrots flew shrieking overhead."

In this same book of Brazilian exploration, Colonel Roosevelt gives a fascinating picture of a journey up a stream picturesquely described as the "River of Tapirs." He and his party went up this river in a launch, and the Colonel's description of the scene reminds one of Joseph Conrad's "Heart of Darkness."

"Ahead of us," wrote the Colonel, "the brown water stream stretched in curves between endless walls of dense tropical forest. It was like passing through a gigantic greenhouse. Wawasa and burity palms, cecropias, huge figs, feathery bamboos, strange foliage, as delicate as lace, trees with buttressed trunks, trees with boles rising smooth and straight to lofty heights, all woven together by a tangle of vines, crowded down to the edge of the river. Their drooping branches hung down to the water, forming a screen through which it was impossible to see the bank. Rarely one of them showed flowers—large white blossoms, or small red or yellow blossoms. More often the lilac flowers of the begonia-vine made large patches of color. Innumerable epiphytes covered the limbs, and even grew on the roughened trunks."

There are frequent references to the wawasa palms and the Colonel noticed on one of them, a veritable giant in height, a mass of purple orchids growing from the side of the trunk, half-way to the top. On another big tree, not a palm, he saw more than a hundred troupials' nests (the troupial is the South American oriole). He also mentions seeing palms of different varieties with short fronds. Wild plantains were plentiful and there were huge trees like those that grow in California.

At other times the trees would be few and far between, or else they would be scrubby and unprepossessing.

"Day after day; we rode forward across endless flats of grass and of low open scrubby forest, the trees standing far apart and in most places being but little higher than the head of a horseman. Some of them carried blossoms, white, orange, yellow, pink; and there were many flowers, the most beautiful being the morning gloiies. Among the trees were bastard rubber trees, and dwarf palmetto; if the latter grew more than a few feet high their tops were torn and dishevelled by the wind."

Members of the Roosevelt party also found many fossil-tree trunks which the Colonel believed to be of Cretaceous age.

Here is a pretty picture that the Colonel paints:

"In the deep valleys were magnificent woods, in which giant rubber-trees towered, while the huge leaves of the low-growing pacova or wild banana, were conspicuous in the undergrowth. Great azure butterflies flitted through the open, sunny glades, and the bell-birds sitting motionless, uttered their ringing calls from the dark stillness of the columned groves."

While going down the famous River of Doubt, now the Rio Teodoro (River Theodore), the undergrowth was so dense that trees leaned over the river from both banks, forming barriers, which the men in the leading canoes cleared away with their axes. There were many palms and the Colonel noticed a handsome species of bacaba. He also gives an interesting description of stopping at a bee-tree to get honey.

"The tree was a towering giant of the kind called milk-tree, because a thick milky juice runs freely from any cut," he wrote. "Our camaradas eagerly drank the white fluid that flowed from the wounds made by their axes. I tried it. The taste was not unpleasant, but it left a sticky feeling in the mouth."

He also speaks particularly about the cajazeira tree, whose fruit he found delicious, and makes the suggestion that this fruit would make a valuable addition to our orchards, pointing out that, although tropical, the tree thrives when domesticated and propagates rapidly from shoots. He advises the Department of Agriculture to experiment and see if this tree would not grow in Southern California and Florida.

While going down the Rio Teodoro, Colonel Roosevelt saw many trees, the tops of which were covered with yellow-white blossoms and red blossoms. Then he mentions a peculiarity that demonstrates his closeness of observation:

"Many of the big trees were buttressed at the base with great thin walls of wood. Others, including both palms and ordinary trees, showed an even stranger peculiarity. The trunk, near the base, but sometimes six or eight feet from the ground, was split into a dozen or twenty branches or small trunks which sloped outward in tent-like shape, each becoming a root. The larger trees of this type looked as if their trunks were seated on the tops of the pole frames of Indian tepees."

While it was the fauna more than the flora that interested Colonel Roosevelt, as has been remarked at the beginning of this article, nevertheless his remarkable powers of observation were always in evidence, which lends interest to everything that he

describes, whether it is a lion charging upon him with the speed of an express train, trees that strangled each other, or trees that dripped with honey when wounded. This observation was instinctive with Theodore Roosevelt because he was a born naturalist.

SHORTER NOTES

HELIANTHUS BESSEYI BATES.—*Helianthus besseyi* J. M. Bates was described in American Botanist, February, 1914, p. 17, from specimens collected at Red Cloud, Nebraska. Last spring Mr. Bates was kind enough to send me some of the tubers, which I planted in my garden at Boulder, May 5. The tubers are elongate-fusiform, and yellowish. Today (September 14) the plants are past flowering, though the closely related *H. alexandri*,* a few feet away, is in full bloom. The plants are about 5 feet high when well grown, and are strict, with comparatively few floriferous branches, entirely in the style of *alexandri*. The stems are reddish and scabrous, as in *alexandri*, but rougher. Leaves opposite, alternate above, as in *alexandri*. Leaves subovate, conspicuously broader than in *alexandri*, and somewhat paler, the bases broad-cuneate, the petioles fairly long and distinctly winged. As in *alexandri*, the upper surface is rough, the lower soft-hairy, with the hairs on the midrib appressed. The rays are orange, as in *alexandri*, but are much shorter, about 30 mm. (in *alexandri* 41 mm. long and 14.5 wide). The achenes are the same in both, but the disc-corollas of *besseyi* are shorter, with paler lobes. The involucral bracts are spreading, but short (about 9 mm. long, base of involucre to end of longest phyllary about 12 mm.), with blackish bases (entirely pale green in *alexandri*), and there is the appearance of an extra row. The leaves are entirely dull above. The plant is quite distinct from *H. nebrascensis* (Ckll.), which also occurs at Red Cloud, and although it is close to the Michigan *H. alexandri*, it must evidently be separated from it, having a number of salient characters. It adds one more to the assemblage of closely related species grouping around *H. tuberosus*.

* *Helianthus tuberosus alexandri* Ckll., Amer. Naturalist, LIII: 188; *H. alexandri* Ckll., Monthly Bull. Calif. State Comm. Horticulture, VIII: 249. (1919.)

A matter for investigation is the relationship between *H. besseyi* and *H. apricus* Lunell, Amer. Midl. Nat, 1910, 237. The latter species, found on the open prairie in North Dakota, differs from *besseyi* by the narrower leaves, and the involucral bracts in two rows. The description is not sufficiently detailed to permit adequate comparisons. In the herbarium of the New York Botanical Garden I have examined *H. apricus camporum* (Lunell), from the type lot. This variety has leaves shaped as in *besseyi*, but more remotely dentate, and (according to the description) scabrous beneath. *H. nitidus* Lunell, from the description, seems more like *H. nebrascensis*, but the rays are less than half as long.—T. D. A. Cockerell

Boulder, Colorado

The Supposed Southern Limit of the Eastern Hemlock.—The common hemlock of the eastern United States—or spruce pine as it is often called in the South—*Tsuga Canadensis*, has long been known to range farther south in Alabama than in any other state. Dr. Charles Mohr knew it in this state only from a few localities in Winston County, at altitudes exceeding 800 feet, where it was probably first made known by Judge T. M. Peters about fifty years ago.* In March, 1906, I found it near Spruce Pine, in Franklin County,† and in November, 1911, in the northeastern portion of Marion County and at the great natural bridge in the southwestern part of Winston County.‡

About twelve years ago a friend in Tuscaloosa wrote me that he had seen a hemlock tree floating in the Warrior River near that place at a time of high water, and wondered where it had come from. The nearest known stations for it at that time were in Winston County, about 60 miles from Tuscaloosa in a straight line and at least 100 by water, but the tributaries of the Warrior River there are so small and so rocky that it was hard to believe that a tree could have floated all the way and remained recognizable. The facts set forth below, however, explain how such a tree could have reached Tuscaloosa with a much shorter journey.

* See Mohr's Plant Life of Alabama (1901), pp. 34, 72, 159, 208, 324, 325.

† Bull. Torrey Club **33**: 524–525. 1906.

‡ Geol. Surv. Ala., Monog. 8: 49, 136. 1913.

On September 2, 1919, with a party of visiting geologists, I had a boat ride on the reservoir from which water is pumped to most of the iron furnaces and rolling mills of the Tennessee Coal, Iron & Railroad Co. in the vicinity of Birmingham. It was constructed eight or nine years ago by building a dam about 90 feet high across Village Creek just above the mouth of Venison Creek, about three miles southwest of Adamsville, in Jefferson County, Alabama, in latitude 33° 34′, and about 500 feet above sea-level. This creek is a tributary of the Locust Fork of the Warrior River, and the dam is about twelve miles from the river by the course of the creek, which flows in a general northwesterly direction.

On the shady side of the reservoir, with a northeasterly exposure, and also in the gorge just below the dam, we noticed several specimens of the tree in question. I did not have time to go down the creek below the dam, but judging from the available topographic maps conditions should be favorable for the hemlock all the way down to the river. The whole country from there to Tuscaloosa is in the Warrior coal field, characterized by shaly sandstone of the upper Carboniferous. This creek, like several other tributaries of the Locust Fork, takes its rise in a limestone valley, but that may have little to do with the occurrence of the hemlock.

At one point a long-leaf pine, *Pinus palustris*, was noticed on the sunny side of the reservoir directly opposite some of the hemlock and scarcely a stone's throw away. That pine is common on many hills and mountains in Jefferson County, and extends inland to the northern part of Walker County,* but this is probably the first time that its range has been recorded as overlapping that of *Tsuga Canadensis*. Incidentally, there seems to be a wide gap between the known stations for the latter in Alabama and those in Georgia and Tennessee, a fact not easily explained at present.—ROLAND M. HARKER.

* See Geol. Surv. Ala., Monog. 8: 54, 140. 1913.

UNIVERSITY, ALA.

REVIEWS

Britton and Rose's Cactaceae*

The recent death of Andrew Carnegie, who lived only a few weeks after this volume was issued, recalls the publication of *Carnegiea gigantea* in 1908, when the senior author first associated the iron master with the cactus family. To many the assignment of his name to the giant cactus appeared at that time a doubtful compliment either to the cactus or to Mr. Carnegie. It is not without interest, then, that the chief agency which he set up for the advancement of science should have sought out the authors of the present great volume who have abundantly justified the wisdom of that association. For the Carnegie Institution has issued, and the authors have prepared, the most sumptuous botanical publication since Dyke's "The genus Iris."

The book, as was to be expected, deals with the systematic botany of the cactus family, but more thoroughly than any other as yet issued. The only other work of monographic pretensions is Karl Schumann's Gesamtbeschreibung der Kakteen issued in 1903. As an illustration of the difference in the volumes, *Opuntia* proper in the new book contains 254 species, in the old one, 162. Not all of the increase is due to the newer taxonomy; in fact a surprising amount of it is due to exploration, and to the consequent discovery of new kinds of prickly pears. This group occupies the major part of the volume, and segregates from it, with *Pereskia*, the whole of it. The extent of the exploration, from British Columbia to the Argentine, its comprehensive nature, including hundreds of the islands and keys of the West Indies, its personnel which has included nearly all the botanists with tropical experience in the United States and many of our South American and West Indian neighbors,—this has given the authors who have done a tremendous amount of exploration themselves, an opportunity for comparative study

* Britton, N. L. and Rose, J. N. The Cactaceae. Descriptions and Illustrations of Plants of the Cactus Family. Vol. 1, pp. 1–236. Plates 1–36 (many in color), figs. 1–303. Carnegie Institution of Washington, Publication No. 248. 21 June 1919. Price $18.00.

of these puzzling plants, that they have used to splendid advantage.

Detailed comment of such a large work is obviously impossible, but mention should be made of the scheme the authors have followed. There are, of course, keys to the tribes, genera under the tribes, and to the series and species where the genera are large enough to need such subdivisions.

For each of the species there is a complete synonymy, and where, as in *Opuntia*, there are 900 names known for about 250 plants this will be of great value. There follows a description of the species, a statement of its type locality and the distribution of it. Notes of its variants, its affinities to related species, illustration of it and other items, complete the record of the treatment. Very nearly all the species are illustrated by photographs of mature plants, drawings of significant parts, or by colored illustrations of the joints or flowers or fruits. No recent botanical work has such a wealth of illustrations, and in such plants as the cactus, which exhibit different characters at different periods of growth, these are of paramount value in aiding identification.

The prickly pears, comprising four fifths of the volume, are grouped into 3 subgenera and 46 series, the characters of which are based on a study of living plants of which the New York Botanical Garden and the Department of Agriculture now have the largest collections known. Scores of cases of mistaken identity, of the description of stages of one species as several, of mistaken ideas of distribution and the other hazards due to the difficulty of the group and early misconceptions, are now straightened out. The gardener, field botanist, plant geographer and ecologist can now find for the first time an accurate record of the species and their distribution. Such a work and its changes will produce shocks to the mentally well-intrenched, as for instance, that the supposedly widely distributed *Opuntia tuna* is actually confined to the lowlands of Jamaica; that *O. vulgaris* Mill. long supposed to be native here-abouts, does not occur in North American except as an escape in Cuba, and many other errors that have passed current.

An interesting tabulation could be made by those interested in endemism on the number of prickly pears with a relatively restricted distribution. Scores have been found only in isolated regions, a few scattered through neighboring cactus deserts, still fewer of very general distribution in tropical America, of which *Opuntia ficus-indica* seems to be the most ubiquitous.* As the group is wholly American, the distribution in North or South America, or in the West Indies, plotted out as to the apparent centers of distribution of some of the significant species, would be of particular interest. As a partial aid to such an understanding, the reviewer lists the chief cactus regions of the area covered by the book with the number of species recorded from there by the authors.

Southwestern United States and adjacent Mexico.........	63
Mexico and Central America............................	62
The Argentine, including Paraguay, Uraguay & Chile......	61

As between these two great centers of cactus species, for the first two are probably inseparable, the links are very few and scattered. The authors record only three species that are common, as natives, to both regions and are found in the intervening area. There are, of course, other prickly pears between these two great centers as, for instance, 12 in Bolivia, 14 in Peru, 9 in Ecuador, 7 in Brazil, 5 in Colombia, and 4 in Venezuela and adjacent islands.

These 56 species, endemics nearly all, and often separated by rain forests, seem a somewhat slender thread to stretch across the three or four thousand miles between the northern and southern culminations of the cactus flora. As a matter of record, the figures for the rest of the genus are given herewith. West Indies 15, Bahamas 4, Tropical America generally 3, Southeastern United States 11, Central United States 6, Northeastern United

* An interesting case of apparent endemism is that of *O. Skottsbergii*, a species described as new in the book. It is native in Santa Cruz territory in the Argentine, and, apparently unknown to the authors, was described briefly, it is true, by Skottsberg in his Die Vegetationsverhältnisse Längs der Cordillera de los Andes, which was published on April 26, 1916, in Kungl. Sv. Vetenskapsakademiens Handlingar, Band 56, no. 5, at page 268. Dr. Skottsberg credits the species to the authors of the present volume, so there is fortunately only a question of priority of publications involved in the case, not another name added to the nine hundred!

States 1, Galapagos Islands 1. The other genera of the Cactaceae may reveal, when the authors have completed the four volumes which will comprise the work, some further data on these problems of distribution. Not the least valuable feature of the book is the basis it will furnish for such studies, and in the final volume it is to be hoped the authors will include such data.

Something has recently been issued or spoken about coöperation in science. This attack upon the problems of the Cactaceae, largely engineered by Messrs. Britton and MacDougal, has secured the cooperation of the Carnegie Institution, New York Botanical Garden, U. S. National Museum, U. S. Department of Agriculture, and the Gray Herbarium. Add to this hosts of individuals who have contributed notes or specimens and it is little wonder that, under the guidance of the authors, the book should have grown into incomparably the best one on its subject that has yet appeared.

N. T.

NEWS ITEMS.

Professor Edward W. Berry, of the Johns Hopkins University, has returned to Baltimore after six months exploration of the Andes of Peru, Bolivia and Chile.

At the New York Botanical Garden the lectures for the latter part of November will be held in the Central Display Greenhouses at three-fifteen o'clock. They will occupy half an hour, will be illustrated by living plants and followed by demonstrations in the greenhouses. The dates and subjects are as follows:

Nov. 15. "Cycads and Sago Palms," by Dr. N. L. Britton.
Nov. 22. "Tropical Orchids," by Mr. Geo. V. Nash.
Nov. 29. "Tropical Ferns and Their Relatives," by Dr. H. A. Gleason.

In a recent flight from Italy to Paris an aeroplane, which was carrying as a passenger Mr. Aaron Aaronsohn, was wrecked, killing both occupants. Mr. Aaronsohn will be remembered by the Club as the director of the Jewish Agricultural Experiment

Station in Palestine. He lectured at the American Museum of Natural History on February 15, 1913, on "The story of the Wild Wheat and its practical development."

Professor A. H. Cockayne, a son of Dr. L. Cockayne of Wellington, New Zealand, is now in the United States, visiting the more important botanical institutions. He delivered a lecture before the Club on November 11, on "Botanical features of the flora of New Zealand."

In the September number of the *Journal* of the International Garden Club there are two articles of interest to botanists. One is Carl Purdy's "Pacific Coast Wild Flowers" which contains a wealth of material on the ornamental wild plants of that region and a brief history of their earliest collectors. The other is by Mrs. Zelia Nuttall of Coyoacan, Mexico, on "The Flower lovers and gardeners of Ancient Mexico." While it is an important contribution to a rather obscure subject, the author, who has lived for years near Mexico City, has written with a delightful style that will interest all who enjoy accounts of the early races of Americans and their relation to the flowers and plants of the country.

TORREYA

Vol. 19 November, 1919 No. 11

SCROPHULARIACEAE OF THE LOCAL FLORA. IV

BY FRANCIS W. PENNELL

(*Continued from September* TORREYA)

13. AUREOLARIA Raf. New Fl. Amer. 2: 58. 1837

Type species, *A. villosa* Raf.

Annual. Stem, leaves and calyx with stalked or sessile glands. Leaves bipinnatifid, more or less pectinately cut. Calyx-lobes dentate to pectinate. Corolla externally glandular-pubescent, within pubescent over bases of the posterior lobes; more or less marked or tinged with purple-red. Anther-sacs 2.5–4 mm. long. Capsule ellipsoid, 9–12 mm. long, 1/2–2/3 enclosed in the calyx-tube, glandular-puberulent. Seeds .8 mm. long, not winged. Pedicels 10–28 mm. long. (*Panctenis* Raf.)

Stem closely pubescent above, not or scarcely glandular. Leaves puberulent, not or slightly glandular. Capsule narrowly ellipsoid, 9–11 mm. long.

Leaves 3–6 cm. long. Pedicels mostly shorter than to equaling the bracts. Stem (frequently) glandular-hirsute below. — 1. *A. pedicularia.*

Leaves 1.5–2.5 cm. long. Pedicels longer than the bracts. Stem not glandular-hirsute below. — 1*a*. *A. pedicularia caesariensis.*

Stem glandular-pubescent above with scattered glands. Leaves glandular-puberulent to pubescent. Capsule ellipsoid, 11–12 mm. long. — 1*b*. *A. pedicularia intercedens.*

Perennials. Not glandular. Leaves entire to pinnately cut, and slightly bipinnatifid, though not pectinate. Corolla externally glabrous, within glabrous or diffused-pubescent; not marked or tinged with red-purple. Anther-sacs 4–6 mm. long. Capsule ovate to globose-ovate in outline, not enclosed within the calyx-tube, not glandular. Seeds 1.5–2.7 mm. long, broadly winged.

[No. 10, Vol. 19 ot TORREYA, comprising pp. 187–204, was issued Dec. 1, 1919.]

Pedicels 1.5–10 (–15) mm. long. (*Euaureolaria.*)

Capsule densely rusty-pubescent. Stem pubescent and leaves downy-pubescent. Pedicels 1.5–3 mm. long. — 2. *A. virginica.*

Capsule glabrous. Stem glabrous and leaves glabrous or minutely puberulent on the upper surface. Pedicels 3 mm. long or longer.

Stem slender, not glaucous, rarely purplish. Petioles very short, less than 10 mm. long. Lower leaves lanceolate to ovate-lanceolate, widest below the middle, long-acuminate. Pedicels 3–8 mm. long. Corolla 30–35 mm. long. Seeds 1.5–1.7 mm. long. — 3. *A. laevigata.*

Stem relatively stout, glaucous, frequently purple. Petioles mostly over 10 mm. long. Lower leaves ovate-lanceolate to ovate, widest about the middle, not long-acuminate. Pedicels 5–10 (–15) mm. long. Corolla 35–40 mm. long. Seeds 2–2.7 mm. long. — 4. *A. flava.*

1. Aureolaria pedicularia (L.) Raf.

Gerardia pedicularia L. Sp. Pl. 611. 1753. "Habitat in Virginia, Canada." Type not seen, but description sufficiently distinctive.

Panctenis pedicularia (L.) Raf. New Fl. Amer. **2**: 61. 1837. The specific name spelled by Rafinesque "pedicularis."

Aureolaria pedicularia (L.) Raf. l.c. 61. 1837.

Dasystoma pedicularia (L.) Benth. in DC. Prod. **10**: 521. 1846.

Agalinis pedicularia (L.) Blake in Rhodora **20**: 70. 1918.

Flowering from early August to late September, fruiting from September into November.

Dry oak-woodland, thin soil, sandy or rocky, occasional or local above Fall-line, more frequent southwestward; in the Coastal Plain of Long Island and New Jersey, passing into var. *caesariensis.* Northwestward the species passes into var. *intercedens.* Ranges, southward and westward mainly through its varieties, from western Maine to North Carolina and Minnesota.

1*a*. Aureolaria pedicularia caesariensis Pennell in Bull. Torrey Club **40**: 413. 1913. "Type, Atco, Camden Co., New Jersey, Sept. 7, 1911, *F. W. Pennell 3545* in Herb. University of Pennsylvania."

Sandy open woodland, Coastal Plain of Long Island and New Jersey, mainly in the Pine Barrens, where it replaces the species. Occurs northeastward to southeastern Massachusetts.

1*b*. **Aureolaria pedicularia intercedens** Pennell, var. nov.

Stem glandular-pubescent above, with spreading or recurved short hairs, scattered among which occur glands which are borne on stalks shorter than or longer than the pubescence. Leaves somewhat puberulent with short-stalked glands. Calyx-lobes 8–13 mm. long. Capsule 11–12 mm. long. Otherwise as in the species.

Type, Mt. Arlington, Morris Co., New Jersey, collected in flower August 26, 1906, *K. K. Mackenzie 2356;* in Herb. Missouri Botanical Garden.

Environment of the species, between which and the densely hirsute western *A. pedicularia ambigens* (Fernald) Farwell it forms a connected series of intergradations. Occasional in northern New Jersey and eastern Pennsylvania, to be expected with the species in our northwestern counties in New York.

2. Aureolaria virginica (L.) Pennell.

Rhinanthus virginicus L. Sp. Pl. 603. 1753. "Habitat in Virginia." As specimen in the Linnean Herbarium bears the handwriting of Linné the younger and so appears to have been a late addition, Gronovius's plant must be taken as the type. This is *Clayton 488*, recently identified by *Dr. S. F. Blake*, in Rhodora **20**: 66. 1918, as the plant here considered. Our traditional applications of the names *virginica* and *flava* must be transposed.

Aureolaria villosa Raf. New Fl. Amer. **2**: 59. 1837. No type locality given, nor type known to exist. Description sufficiently distinctive.

Dasystoma pubescens Benth. in DC. Prod. **10**: 520. 1846. "In Americae sept. civitatibus orientalibus frequens." Type not verified, but description sufficiently distinctive.

Gerardia virginica (L.) Britton in Prelim. Cat. N. J. Pl. 40. 1888.

Dasystoma virginica (L.) Britton in Mem. Torr. Bot. Club **5**: 295. 1894.

Aureolaria virginica (L.) Pennell in Bull. Torr. Bot. Club **40**: 409. 1913.

Agalinis virginica (L.) Blake in Rhodora **20**: 71. 1918.

Flowering from early July to mid-August, fruiting from August to October.

Dry open oak-woods, usually sand or a sandy loam, frequent or common throughout our area, less general within the Pine Barrens. Ranges from New Hampshire to Florida, west to Michigan, Kentucky and Louisiana.

3. Aureolaria laevigata (Raf.) Raf.

Gerardia levigata Raf. Ann. Nat. 13. 1820. "It grows on the knob hills of Kentucky, the Cumberland mountains and the Alleghany." No type known to exist, unless it be a specimen in Herb. New York Botanical Garden, labeled in Rafinesque's handwriting, "Gerardia—n. sp.—Kentucky."

Aureolaria levigata (Raf.) Raf. New Fl. Amer. **2**: 59. 1837.

Dasystoma laevigata (Raf.) Chapm. Fl. S. Un. St. ed. II: 636. 1883.

Agalinis laevigata (Raf.) Blake in Rhodora **20**: 71. 1918.

Oak-woodland, usually rocky, along streams or on mountain-sides along the Susquehanna River in Lancaster Co., Pennsylvania. Ranges through the Appalachians from central Pennsylvania to South Carolina and Tennessee.

4. Aureolaria flava (L.) Farwell.

Gerardia flava L. Sp. Pl. 610. 1753. "Habitat in Virginia, Canada." Specimen in Linnean Herbarium identified by Bentham; see in Comp. Bot. Mag. **1**: 198. 1836.

Gerardia glauca Eddy in Med. Repos. N. Y., IInd Hex. **5**: 126. 1807. Plandome, Long Island. *C. W. Eddy.* Type not seen nor known to exist, but description quite distinctive.

Gerardia quercifolia Pursh, Fl. Amer. Sept. 423. 1814. "On the banks of rivers, in rich shady places, Pensylvania to Carolina." Type not seen, but description distinctive.

Aureolaria glauca (Eddy) Raf. New Fl. Amer. **2**: 60. 1837.

Dasystoma quercifolia (Pursh) Benth. in DC. Prod. **10**: 520. 1846.

Dasystoma flava (L.) Wood, Class-Book 529. 1861. As to synonymy, not description, the latter applying to *Aureolaria virginica*.

Agalinis glauca (Eddy) Blake in Rhodora **20**: 71. 1918.

Aureolaria flava (L.) Farwell in Rep. Mich. Acad. Sci. **20**: 188. 1918.

Flowering from late August to late September, fruiting from September to November.

Dry to rather moist oak-woodland, usually on rocky hillsides, loam or sometimes in sandy soil, frequent or locally common through the counties above the Fall-line, especially toward the mountains; on northern Long Island, but rare in southern Long Island and very rare in the Coastal Plain of New Jersey. Including varieties, this species ranges from Maine to Florida, Illinois, Arkansas and Louisiana.

14. AGALINIS Raf. New Fl. Amer. **2**: 61. 1837

Type species, *A. palustris* Raf.

Corolla with lobes all spreading, pubescent within at base of posterior lobes.
  Seeds dark-brown. Plants tending to blacken in drying. Calyx-tube not evidently reticulate-venose.
    Pedicels less than 12 mm. long. Inflorescence of normal racemes. Seed-coat with dark-brown ridges, between which are broad areas, paler and minutely reticulate.
      Leaves and calyx-lobes obtuse to acutish. Anther-sacs obtuse to acutish. Plant fleshy, bushy-branched below, with elongated racemes above. Pedicels 5–12 mm. long. Corolla 12–17 mm. long. 1. *A. maritima.*
      Leaves and calyx-lobes acute to acuminate. Anther-sacs mucronate to minutely awned. Plants not fleshy, more uniformly branched. Pedicels rarely over 5 mm. long.

Calyx-lobes 4/5–7/8 the length of the tube, triangular-lanceolate to lanceolate. Corolla 12–20 (–23) mm. long. Stem 1–6 dm. tall. Anther-sacs somewhat pubescent to glabrous. 2. *A. paupercula.*

Calyx-lobes 1/6–1/2 the length of the tube, triangular-lanceolate to subulate. Corolla 20–38 mm. long. Stem 3–12 dm. tall. Anther-sacs densely lanate.

Stem relatively stiffly branched, sparingly scabrellous. Calyx-lobes triangular-lanceolate to subulate. Corolla 20–38 mm. long. Leaves linear, 1–3 mm. wide. 3. *A. purpurea.*

Stem slender, virgately branched, glabrous. Calyx-lobes triangular-subulate to subulate. Corolla 20–25 mm. long. Leaves narrowly linear to almost filiform, .5–1 mm. wide. 4. *A. virgata.*

Pedicels 15–40 mm. long. Inflorescence a short raceme, one pedicel (by arrested growth of the rhachis) appearing terminal. Seed-coat with dark-brown ridges, between which are narrow scarcely paler areas. Corolla 18–25 mm. long. Leaves narrowly linear to filiform. 5. *A. Holmiana.*

Seeds yellowish-brown. Plants scarcely tending to blacken in drying. Calyx-tube evidently reticulate-venose. Corolla 13–15 mm. long.

Calyx-tube campanulate, 3 mm. long, firmer in texture, 2/3–3/4 the length of the capsule, its lobes .5–1 mm. long, triangular-acuminate, not or scarcely callose. Seeds .4–.6 mm. long, strongly reticulate. Pedicels mostly 1–2 times the length of the bracts. Stem usually 1–4 dm. tall. 6. *A. acuta.*

Calyx-tube hemispheric, 2.5–3 mm. long, thinner in texture, 3/5–2/3 the length of the capsule, its lobes minute, .05–.2 (–.3) mm. long, strongly callose. Seeds .6–.8 mm. long, obscurely reticulate. Pedicels mostly 2–3 times the length of the bracts. Stem usually 2–5 dm. tall. 7. *A. decemloba.*

Corolla with the posterior lobes ascending-arched over the stamens and style, glabrous within at base of the posterior lobes. Racemes elongated, normal. Pedicels 12–27 mm. long. Seeds dark-brown. 8. *A. tenuifolia.*

1. Agalinis maritima (Raf.) Raf.

Gerardia maritima Raf. in Med. Repos. N. Y., IInd Hex. 5: 361. 1808. "Found in the islands of Egg-Harbour, in New Jersey." No type known to exist, but description

quite distinctive. An unpublished plate of Rafinesque's is in the library of the New York Botanical Garden.

Gerardia purpurea crassifolia Pursh, Fl. Amer. Sept. 422. 1814. "In salt marshes, near New York." Type not seen, but description sufficiently distinctive.

Agalinis maritima (Raf.) Raf. New Fl. Amer. **2**: 62. 1837.

Flowering from mid-July to early September, fruiting September to October.

Salt marshes, along the Atlantic coast, Connecticut, New York and New Jersey. If separable from the much larger plant of the Southern and Gulf coast, our species ranges from Virginia northward to Maine, becoming progressively smaller and simpler northward.

2. Agalinis paupercula (A. Gray) Britton.

Gerardia purpurea paupercula A. Gray, Syn. Fl. N. Amer. II. **1**: 293. 1878. "Lower Canada to Saskatchewan and southward from coast of New England to Penn., N. Illinois and Wisconsin." Numerous specimens labeled by Gray seen, but none indicated as typical. In synonymy is mentioned the name *intermedia* Porter in herb., so selecting a type.

Gerardia paupercula (A. Gray) Britton in Mem. Torr. Bot. Club **5**: 295. 1894.

Agalinis paupercula (A. Gray) Britton in Britton & Brown, Ill. Fl. ed. II. **3**: 210. 1913.

Flowering from early August to September, fruiting September to October.

Moist soil, borders of lakes and in bogs, especially where sandy, in the glaciated region; through the area east of the Hudson River, occasional in Connecticut and northward in New York, very rare southward and on Long Island only at Lake Ronkonkoma; near Dingmans Ferry, Sussex Co., New Jersey (*W. M. Van Sickle* (E)), and doubtless occasional elsewhere in the glaciated region west of the Hudson, especially in New York. Ranges through glacial bog country from New Brunswick to Minnesota, but seems to be much more common in northern New England and in Michigan than through the intervening

area. Along their lines of contact in southern New England, our area and in northern Indiana and Illinois, this intergrades somewhat with its obvious parent, *A. purpurea.*

3. Agalinis purpurea (L.) Pennell.

Gerardia purpurea L. Sp. Pl. 610. 1753. "Habitat in Virginia, Canada." The Linnean diagnosis includes both long and short-pediceled plants, so could include all pink (="purple") flowered species. The first citation accompanied by a figure, Plukenet's "*Digitalis virginiana rubra, foliis & facie Antirrhini vulgaris,*" evidently the prevalent plant of the Atlantic seaboard now under consideration, is counted as the type.

Gerardia purpurea grandiflora Benth. in Comp. Bot. Mag. **1**: 208. 1836. "Hab. New Jersey." Type, labeled "New Jersey, *Torrey* 1834," seen in Kew Herbarium.

Agalinis palustris Raf. New Fl. Amer. **2**: 62. 1837. "Near marshes . . . . From New England to Carolina." Type not known to exist. Evidently intended for the prevalent plant of the Atlantic seaboard.

Agalinis longifolia Raf. l.c. 62. 1837. "Near streams New Jersey to Virginia." Type not known to exist. A smaller form.

Gerardia purpurea f. albiflora Britton in Bull. Torr. Bot. Club **17**: 125. 1890. New Jersey. An albino state. Plants with pure white corollas are occasional in any species of this genus.

Gerardia purpurea parvula Pennell in Proc. Acad. Nat. Sci. Phila. **62**: 572. 1911. "Serpentine, Wawa, Delaware county, Penna., *F. W. Pennell 2689,* coll. Sept. 25, 1910, in Herb. Acad. Nat. Sci. of Phila." The smaller-flowered depauperate plant characteristic of the Serpentine Barrens.

Agalinis purpurea (L.) Pennell in Bull. Torr. Bot. Club **40**: 126. 1913.

Aureolaria purpurea (L.) Farwell in Rep. Mich. Acad. Sci. **20**: 189. 1918.

Flowering from late August to mid-September, fruiting September to October.

Moist sandy soil, edges of salt-marsh, of lakes, or of rivers, in depressions among sand-dunes, or locally on barren magnesian loam in the Serpentine; abundant through the Coastal Plain of New Jersey and common in southern Long Island, in the Pine-Barrens replaced by *A. virgata;* above the Fall-line occasional near ponds and bogs of northern New Jersey, in the bogs of Lancaster Co., Pennsylvania, and in meadows and on dry grassy upland of the Serpentine Barrens of Delaware and Chester counties, Pennsylvania. Ranges from Massachusetts to Florida, Minnesota and Texas, mainly in the Coastal Plain or at low elevations inland.

4. Agalinis virgata Raf. New Fl. Amer. **2**: 62. 1837. "Glades of Pine woods in South New Jersey near Mullica Hill, &c." Type not known to exist.

Gerardia racemulosa Pennell in Torreya **11**: 15. 1911. "Type—Parkdale, Camden Co., N. J., *F. W. Pennell 2692* Coll. Sept. 27, 1910, in Herb. Acad. Nat. Sci. of Phila."

Flowering from September to mid-October, fruiting slightly later.

Moist sandy pine-barrens, or occasionally in open sand, in the Pine Barrens of Long Island (Great River, Suffolk Co., *E. P. Bicknell*) and of southern New Jersey. Ranges from Long Island to South Carolina, in the pine barrens of the Coastal Plain. An obvious derivative of *A. purpurea.*

5. Agalinis Holmiana (Greene) Pennell.

Gerardia Holmiana Greene, Pittonia **4**: 52. 1899. "Plentiful in open pine and oak groves along Michigan Avenue south of the Soldiers' Home grounds near Brookland, D. C., collected by Mr. Holm and the writer, 20 Oct., 1898." No specimen of this date seen, but one in the herbarium of the New York Botanical Garden, of Dr. Greene's collecting, from Brookland, D. C., dated Oct. 16, 1898, may stand as the type. I have collected this plant at the type station.

Agalinis Holmiana (Greene) Pennell in Bull. Torr. Bot. Club **40**: 429. 1913.

Flowering early September to mid-October, fruiting slightly later.

Dry sandy pine-land, in the Coastal Plain. Occasional on Long Island, and common through the Pine Barrens of southern New Jersey. Ranges from Long Island to Alabama, through the Coastal Plain.

6. Agalinis acuta Pennell in Bull. Torr. Bot. Club **42**: 338. 1915. "Type: dry sandy downs, Edgartown, Martha's Vineyard, Massachusetts, collected in flower September 12, 1901, *M. L. Fernald 45* in United States National Herbarium."

Flowering from late August to mid-September, fruiting September to October.

Dry sandy soil, sterile sandy loam, local in the Coastal Plain of Long Island, and known inland from Farmington, Hartford Co., Connecticut (*Bissell 14, 48, 439*). Abundant on the Hempstead Plains of Long Island, one of the most distinctive plants of that prairie.

7. Agalinis decemloba (Greene) Pennell.

Gerardia decemloba Greene, Pittonia **4**: 51. 1899. "Plant not uncommon about Brookland, D. C., inhabiting grassy knolls and hillsides bordering on pine woods." A specimen in herb. New York Botanical Garden, collected by Dr. E. L. Greene at Brookland, D. C. in Oct., 1898, may stand as the type.

Agalinis decemloba (Greene) Pennell in Bull. Torr. Bot. Club **40**: 434. 1913.

Flowering from early September into October, fruiting late September an October.

Dry soil, sand or clay, in our area only in southern Lancaster Co., Pennsylvania. (New Texas and Wakefield.) Ranges from thence southwestward to northern Alabama, but with a distribution much broken, though, like the last, locally common.

8. Agalinis tenuifolia (Vahl) Raf.

Gerardia tenuifolia Vahl, Symb. Bot. **3**: 7. 1794. "Habitat in America septentrionali." Type in Herb. Universi-

tetets Botaniske Museum, Copenhagen, Denmark, collected by *Von Rohren*, and said to be probably from Philadelphia, is identified by Dr. C. H. Ostenfeld as identical with my number *2681* from Secane, Delaware Co., Pennsylvania.

Agalinis tenuifolia (Vahl) Raf. New Fl. Amer. **2**: 64. 1837.

Gerardia tenuifolia f. *albiflora* Britton in Bull. Torr. Bot. Club **17**: 125. 1890. "Found by Mr. Leggett at South Amboy, and by Mr. Schuh at Rosemont, [New Jersey]." An albino state.

Aureolaria tenuifolia (Vahl) Farwell in Rep. Mich. Acad. Sci. **20**: 189. 1918.

Aureolaria tenuifolia albiflora (Britton) Farwell, l.c. 190. 1918.

Flowering from late August to early October, fruiting September and October.

Dry loam, or at times sandy soil, usually in open deciduous woodland, common throughout the area above the Fall-line; on northern Long Island; in the Coastal Plain of Long Island and New Jersey occasional, or frequent in heavy soils, not in the Pine Barrens. Ranges from Maine to Georgia, Louisiana, Michigan and Missouri, and in its varieties westward to North Dakota, Colorado and Texas.

15. OTOPHYLLA Benth. in DC. Prod. **10**: 512. 1846

Type species, *Gerardia auriculata* Michx.

(?) *Tomanthera* Raf., New Fl. Amer. **2**: 65. 1837. Type species, *T. lanceolata* Raf.

1. OTOPHYLLA AURICULATA (Michx.) Small.

Gerardia auriculata Michx. Fl. Bor. Amer. **2**: 20. 1803. "In pratis regionis Illinoensis." Type not verified, but description sufficiently distinctive.

Seymeria auriculata (Michx.) Spreng. Syst. **2**: 810. 1825.

(?) *Tomanthera lanceolata* Raf. New Fl. Amer. **2**: 66. 1837. "My specimen of Collins' herbarium was collected by Dr. Cleaver in New Jersey." The description of this is erroneous for our plant in describing the anther-sacs as

unequal; actually they are alike in each stamen but those of the posterior stamens are smaller. However I am convinced that ours must be the plant of Rafinesque, and that such an error is due either to a lapse of memory in recording his observation or more likely to confusing in his dried specimen the sacs of two different stamens. This opinion is confirmed by Rafinesque's inclusion in his new genus of Michaux's plant. However for anything less than a certainty and for an untrue name it may be unwise to dispossess Bentham's well-chosen name.

Tomanthera auriculata (Michx.) Raf. l. c. 66. 1837.

Otophylla Michauxii Benth. in DC. Prod. **10**: 512. 1846. New name for *Gerardia auriculata* Michx.

Otophylla auriculata (Michx.) Small, Fl. S.E. Un. St. 1075, 1338. 1903.

Agalinis auriculata (Michx.) Blake in Rhodora **20**: 71. 1918.

Aureolaria auriculata (Michx.) Farwell in Rep. Mich. Acad. Sci. **20**: 189. 1918.

Flowering from late August to mid-September, fruiting September and October.

Old fields and railway banks, occasional in New Jersey and Pennsylvania. Certainly introduced from the prairies of the Mississippi Valley states.

(*To be concluded.*)

THE GRASSES OF SALEM, OREGON AND VICINITY

By James C. Nelson

The following list represents the result of five seasons' collecting in the general region adjacent to Salem. Although the work has been done in the all-too-brief moments that could be snatched from arduous professional duties, and makes no claim to completeness, the writer ventures to believe that most of the grasses growing spontaneously in the territory under consideration have been included. In the case of the introduced species, there is the constant possibility of the establishment of new

forms, which make themselves at home here with surprising facility.

The area covered includes the city of Salem and that part of the Willamette Valley in Marion and Polk Counties contiguous to the city, extending to the foothills of the Cascades on the east and those of the Coast Range on the west, and up to an elevation of perhaps 1,000 feet. The Santiam River may be regarded as the boundary to the south, and no collections have been made more than ten miles north of Salem. No attempt was made to reach the grasses of higher elevations. A number of mountain species would be added by a survey of the subalpine and alpine zones of the Cascades.

The Willamette Valley in this part of its course is in general a wide alluvial plain, lying not more than 200 feet above sea-level, with very slight undulations of surface. From the foothills on the east to those on the west the average width of the valley is about 25 miles. The greater part of the area is under intensive cultivation. Hops and grain were formerly the chief crops, but fruit-growing is rapidly becoming the leading industry.

Immediately south of Salem a range of hills, known on the west side of the Willamette as the Eola Hills, with a maximum elevation of about 1,100 feet, crosses the valley from southeast to northwest. This range seems to represent a very recent geologic upthrust, and the basaltic rocks which form its core are heavily charged with iron, giving to the soil a characteristic red tinge. The Willamette River seems to have originally made its way through these hills along the valley now followed by the Southern Pacific Railway from Jefferson to Salem, and later to have been diverted into the present channel, which has cut a deep gorge through the hills north of Independence. The soil along this old riverbed is made up of stratified boulders and gravel, with a comparatively small admixture of sand and loam. In other parts of the valley there is a subsoil of tough yellow clay overlaid by a rich friable loam, in many places beginning to show exhaustion after seventy years of continuous cultivation. Numerous small streams traverse the area, Mill Creek being the most considerable. These are fringed with a heavy growth

of ash, dogwood, alder, willow, and other low shrubs. On the lighter gravelly soils, *Quercus Garryana* is the prevailing tree. Many fine groves of the "Douglas fir" (*Pseudotsuga taxifolia*) still exist in the level areas, and cover the steeper slopes of the foothills.

The climate is more oceanic than continental in character. There are two sharply contrasted seasonal periods. During the autumn, winter and spring months, the rainfall is heavy, sometimes as much as 14 inches in a single month, with a minimum winter temperature of not below 20 degrees Fahrenheit. The summer on the other hand is almost rainless, and temperatures of 100 degrees are not unknown. During the long dry season the porous soil becomes thoroughly desiccated, and all herbaceous vegetation not under cultivation, with the exception of a few drought-resisting plants and those along the streams, is dried up. On the setting in of the fall rains, however, the vegetation speedily revives, and continues green and luxuriant during the mild winter, reaching its maximum development in May and June. These conditions make it very difficult for any of the introduced pasture-grasses to survive the summer; and while a few of the native species seem better adapted to the arid environment, little attention has hitherto been given them.

No comprehensive attempt to catalogue the grasses of this region seems to have been made. This will be evident from the number of species included in the following list which have not found mention in any of the published manuals dealing with the flora of Western Oregon. These species are marked "X." Introduced species are designated by an asterisk (*). The nomenclature conforms to that used in A. S. Hitchcock's treatment of the Gramineae in Jepson's Flora of California (**1**: 82–189. 1912). The writer is under obligation to Professor Hitchcock and Mrs. Agnes Chase for their kindness in examining and verifying practically all of his specimens. Professor C. V. Piper has kindly placed the results of his long and careful study of the flora of the Northwest at my disposal; and Professor M. E. Peck of Willamette University, who is probably more thoroughly conversant with the flora of Oregon than any other Western

botanist, has very generously contributed the results of his own collection and study. Specimens of practically all these grasses may be found in the herbarium of Willamette University at Salem, and many of them have also been deposited in the Gray and the National Herbaria.

1. **Digitaria humifusa* Pers. Not uncommon on sand-bars along the Willamette River, and beginning to appear on lawns about Salem (X).
2. **Echinochloa crus-galli* (L.) Beauv. Not infrequent along ditches and in low ground, and occasional in cultivated fields.
3. **Setaria viridis* (L.) Beauv. An occasional specimen is found in cultivated ground and along railroad tracks, but it is still to be regarded as a stray in this district.
4. *Paspalum distichum* L. Common on muddy and sandy shores of the Willamette about Salem, and apparently indigenous, although far out of its ordinary range.
5. *Panicum barbipulvinatum* Nash. Common on river-shores, and occasional in sandy fields. Formerly referred to *P. capillare* L., with which it seems to intergrade.
6. *Panicum Scribnerianum* Nash. Not infrequent in dry soil, especially where sand or gravel predominates.
7. *Panicum pacificum* Hitchc. & Chase. On gravelly prairies about Salem, and more frequent toward the mountains.
8. * *Panicum miliaceum* L. An occasional waif on rubbish-heaps about Salem (X).
9. *Leersia oryzoides* (L.) Sw. Along slow streams and on muddy rivershores, sometimes forming extensive colonies.
10. * *Phalaris arundinacea* L. Occasional in waste places about Salem. The var. *picta* L. is not uncommon in cultivation.
11. * *Phalaris canariensis* L. A waif on rubbish-heaps about the State Prison, Salem.
12. * *Anthoxanthum odoratum* L. Not infrequent in pastures and on lawns, appearing very early in spring.
13. * *Anthoxanthum Puelii* Lecoq & Lamotte. Occasionally found in dry alkaline soil along the road-side. It has probably been taken for the preceding (X).

14. *Hierochloe macrophylla* Thurb. In rich woods in the foothills both of the Cascades and the Coast Range.

15. *Stipa Lemmoni* (Vasey) Scribn. On dry rocky hillsides on the Eola Hills in Polk County, where it is locally abundant.

16. * *Phleum pratense* L. Occasionally cultivated, and frequently running wild along roadsides and borders of fields.

17. * *Polypogon monspeliensis* (L.) Desf. In ditches and low ground especially in alkaline soil. Not common.

18. *Alopecurus aristulatus* Michx. Very common in wet places and borders of ponds. The nomenclature of this species is much confused.

19. * *Alopecurus pratensis* L. Found only in one station, along the S. P. tracks about a mile south of Salem, where it is well established.

20. * *Aristida oligantha* Michx. In dry sandy soil and on sand-bars along the Willamette, evidently a recent introduction from the south (X).

21. * *Apera spica-venti* (L.) Beauv. A single specimen was found on a lawn of *Poa pratensis* in Salem (X).

22. * *Agrostis alba* L. Very common along roadsides and in pastures. The form known as "creeping bent" (*A. stolonifera* auth. not L.) is common on lawns in Salem.

23. *Agrostis Hallii* Vasey. Not infrequent on dry banks and borders of woods.

24. *Agrostis foliosa* Vasey. A grass of the seashore and mountains, but following the Santiam River down to an elevation of over not 600 feet.

25. *Agrostis microphylla* Steud. Very common in ditches and low ground, and extremely variable.

26. *Agrostis hyemalis* (Walt.) BSP. Rarely found outside of mountain districts, but occasional along streams at low altitudes.

27. *Agrostis oregonensis* Vasey. In marshes in the old bed of Lake Labish, east of Brooks.

28. * *Notholcus lanatus* (L.) Nash. Abundantly cultivated throughout our range, although of comparatively little value, and escaping freely to fields and roadsides.

29. * *Arrhenatherum elatius* (L.) Beauv. Common in dry fields and on roadsides, and spreading rapidly.
30. * *Aira caryophyllea* L. Abundant everywhere in dry or rocky sterile soil.
31. * *Aira praecox* L. Common in a tract of waste ground east of the S. P. station at Salem, but not observed elsewhere.
32. * *Aira capillaris* Host. On sandbars in the North Santiam River at North Santiam Station, and also in flower-beds on the campus of Willamette University at Salem (X).
33. *Danthonia californica* Boland. In open meadows, scarce in our limits, but becoming more common southward.
34. *Danthonia americana* Scribn. Very common in dry meadows.
35. * *Avena fatua* L. Introduced along railroad-tracks and in waste places (X).
36. * *Avena fatua* L. var. *glabrata* Peterm. With the last, but more common.
37. * *Avena barbata* Brot. Frequent along the S. P. tracks south of Salem—probably a recent introduction (X).
38. * *Avena sativa* L. A very common escape along railroad tracks and in waste places.
39. *Deschampsia caespitosa* (L.) Beauv. A very handsome and variable grass, common in low ground, especially in roadside ditches.
40. *Deschampsia danthonioides* (Trin.) Munro. Common on sand-bars and in dried-up pools along roadsides.
41. *Deschampsia elongata* (Hook.) Munro. Common on the borders of woods and in roadside ditches.
42. *Trisetum cernuum* Trin. Infrequent in low woods.
43. *Trisetum canescens* Buckl. Occasional in dry open woodlands.
44. **Gynerium argenteum* Nees. Although this shows no disposition to spread, it has persisted for years in vacant lots where dwellings once stood (X).
45. *Eragrostis hypnoides* (Lam.) BSP. Very common on muddy shores of the Willamette River.
46. * *Cynosurus cristatus* L. Occasional on lawns and street-parking about Salem.

47. * *Koeleria cristata* (L.) Pers. Rather scarce in dry gravelly soil.

48. *Pleuropogon refractus* (Gray) Benth. Along streams in moist woods in the foothills, not common.

49. *Melica subulata* (Griseb.) Scribn. In open rocky woods, common. Flowers very early.

50. *Melica Geyeri* Munro. Occasional on roadsides near Salem—probably its extreme northern extension (X).

51. * *Briza minor* L. Well established in the State Fair Grounds at Salem. Probably introduced from Southern Oregon, where it is very common (X).

52. *Bromus carinatus* Hook. & Arn. Very common in dry soil everywhere, and probably often confused with the next.

53. *Bromus marginatus* Nees. In dry open places, especially near dwellings, very common.

54. *Bromus polyanthus* Scribn. In waste-places and on street-parkings about Salem, appearing as if introduced (X).

55. *Bromus vulgaris* (Hook.) Shear. Common in dry open woods. A difficult species, very variously understood by Western authors.

56. *Bromus vulgaris* (Hook.) Shear var. *eximius* Shear. With the last, but less frequent.

57. * *Bromus tectorum* L. Becoming common along railroad-tracks and in waste places (X).

58. * *Bromus tectorum* L. var. *nudus* Klett & Richter. With the last, but much less common.

59. * *Bromus villosus* Forsk. Becoming very common along the railroads and in waste places, and threatening to become a serious menace if not checked.

60. * *Bromus rubens* L. An occasional specimen is found along railroad tracks.

61. * *Bromus sterilis* L. Very common in dry sterile soil.

62. * *Bromus hordeaceus* L. Perhaps our most common grass—abundant in dry soil everywhere, and very variable.

63. * *Bromus hordeaceus* L. var. *leptostachys* Beck. In similar situations with the last, but not so common.

64. * *Bromus secalinus* L. Not uncommon in grain-fields, and occasionally cultivated.

65. * *Dactylis glomerata* L. A very common escape to fields and roadsides.

66. * *Poa annua* L. Extremely common along waysides, in cultivated fields and in lawns. Flowers almost continuously throughout the year.

67. * *Poa compressa* L. Not infrequent in sandy soil, along the Willamette.

68. * *Poa pratensis* L. Our commonest lawn-grass, and escaped to meadows and pastures everywhere.

69. *Poa nervosa* (Hook.) Vasey. A mountain species that has been found in our limits only at Silver Creek Falls in the Cascades, on moist rocky banks.

70. * *Poa trivialis* L. Not infrequent in damp shady places.

71. *Poa triflora* Gilib. Common along streams in low ground.

72. *Poa leptocoma* Trin. In damp thickets at Silver Creek Falls.

73. *Poa scabrella* (Thurb.) Benth. Not infrequent in dry gravelly soil about Salem (X).

74. *Poa Howellii* Vasey & Scribn. Not uncommon in dry coniferous woods.

75. *Poa multnomae* Piper. A grass of the Columbia Gorge, but collected on rocks in the bed of Silver Creek, one mile above Silverton (X).

76. *Festuca octoflora* Walt. Rather scarce in dry open places near the Willamette.

77. *Festuca megalura* Nutt. Very abundant in dry soil along roads and in waste places everywhere, appearing as if introduced.

78. * *Festuca myuros* L. Has been found only at one station, on railroad tracks at West Salem, Polk County.

79. * *Festuca bromoides* L. Occasional along roadsides and railroad tracks.

80. *Festuca californica* Vasey. On dry hillsides at Eola, Polk County, not observed elsewhere.

81. * *Festuca rubra* L. Occasional on lawns about Salem, where plainly introduced; but the form on gravelly prairies appears to be native.

82. * *Festuca rubra* L. var. *megastachys* Gaudin. Occasional along railroad tracks (X).
83. *Festuca occidentalis* Hook. Not uncommon in dry open woods.
84. * *Festuca elatior* L. Common on roadsides and borders of fields.
85. *Festuca subulata* Trin. In open thickets and borders of woods. A species of very rapid growth, often reaching a height of 5–6 feet after the first warm days of spring.
86. *Festuca idahoensis* Elmer. Occasional in dry gravelly soil (X).
87. * *Scleropoa rigida* Griseb. Around old buildings in the business district of Salem (X).
88. *Phragmites communis* Trin. In swampy soil in the old bed of Lake Labish, two miles east of Brooks (X).
89. *Glyceria leptostachya* Buckl. Borders of ponds and slow streams, not common.
90. **Glyceria occidentalis** (Piper) comb. nov. First described as *Panicularia occidentalis* in Piper & Beattie, Fl. N. W. Coast 59 (1915). It was originally collected by Hall in the vicinity of Salem, where it is not infrequent along wet ditches. Easily distinguished from *G. leptostachya* by the acutish lemmas. So far as I know it has not yet been transferred to *Glyceria*, and the combination is accordingly proposed.
91. *Glyceria pauciflora* Presl. Common along streams and in wet places.
92. *Glyceria grandis* Wats. With the last, but less common.
93. *Beckmannia erucaeformis* (L.) Host. In ditches and wet meadows, not common.
94. * *Lolium temulentum* L. Rather scarce, but occasionally too abundant in grain fields.
95. * *Lolium multiflorum* Lam. Abundant in dry soil almost everywhere. Apparently long confused with the next. The species is very subject to teratological variations. An apparent hybrid with *Festuca elatior* has been collected.
96. * *Lolium perenne* L. With the last, but less common.

97. * *Lolium perenne* L. var. *cristatum* Doell. A single specimen was collected in a wooded ravine near Eola, Polk County, at considerable distance from any dwelling or cultivated ground.
98. *Agropyron tenerum* Vasey. Not uncommon in dry soil in meadows and grain-fields.
99. * *Agropyron repens* (L.) Beauv. Beginning to appear in gardens and fields, and threatening to become a serious nuisance.
100. *Elymus glaucus* Buckl. Very common in dry soil, and extremely variable.
101. * *Triticum vulgare* L. A common escape along railroads and in waste places. Both the bearded and beardless forms occur. It does not seem worth while to maintain Host's *T. compactum* for the Western "soft" wheat (X).
102. * *Hordeum murinum* L. Very common in waste places.
103. * *Hordeum Gussoneanum* Parl. Common, especially in dried mud along roadsides.
104. * *Hordeum jubatum* L. Only a few isolated specimens have been found in waste places.
105. * *Hordeum nodosum* L. Common along ditches and on banks of streams.
106. *Sitanion jubatum* J. G. Smith. Occasional on dry gravelly prairies about Salem (X).

In addition to the cereals mentioned in the above list, *Zea mays* L. is a common field crop. An occasional farmer attempts the cultivation of "Sudan-grass" (*Andropogon Sorghum* (L.) Brot. subsp. *sudanensis* Piper). *Miscanthus sinensis* Anderss. is sometimes cultivated for ornament. A beautiful hardy Japanese bamboo of the genus *Phyllostachys* is a favorite among the local landscape-gardeners, but has never flowered.

It will be observed that of the 106 species and varieties listed above, 55, or over half the entire number, are introduced, and 51 native; and while the latter number may be regarded as fairly constant, the former may be expected to show a steady increase*

* This finds further illustration in the fact that since writing the above *Digitaria sanguinalis* (L.) Scop. and *Setaria glauca* (L.) Beauv. have both appeared sporadically in Salem.

Nothing is more striking to the casual observer than the vast predominance of introduced *individuals* in the more densely settled areas. Often the native species have been entirely crowded out, and the grass-population over large sections is made up exclusively of immigrants, among which the genera *Bromus* and *Lolium* will show the greatest number of individual representatives.

The following attempt to group our grass-species ecologically is far from being exhaustive, but may serve to throw a little more light on the general phenomena of distribution. The following associations may be distinguished:

1. Riparian society, growing on the sand-bars and islands in the Willamette and Santiam Rivers, and along their muddy or gravelly shores, often in very dry soil: *Digitaria humifusa, Paspalum distichum, Panicum barbipulvinatum, Aristida oligantha, Agrostis foliosa, Aira capillaris, Eragrostis hypnoides, Poa compressa, Festuca octoflora.*

2. Hydrophyte society, growing only in water or wet ground along streams, borders of ponds &c.: *Leersia oryzoides, Alopecurus aristulatus, Agrostis microphylla, A. oregonensis, Deschampsia caespitosa, Poa triflora, Phragmites communis, Glyceria leptostachya, G. occidentalis, G. pauciflora, G. grandis, Beckmannia erucaeformis.*

3. Xerophyte society, found usually only in dry soil, especially on the gravelly prairies: *Panicum Scribnerianum, P. pacificum, Stipa Lemmoni, Aira caryophyllea, Danthonia americana, Koeleria cristata, Bromus sterilis, Poa scabrella, Festuca megalura, F. rubra, F. idahoensis, Agropyron tenerum, Elymus glaucus, Sitanion jubatum.*

4. Silvicole society, generally occurring only in or at the borders of open woods: *Trisetum cernuum, T. canescens, Melica subulata, Bromus vulgaris, B. vulgaris* var. *eximius, Poa Howellii, Festuca occidentalis, F. subulata.*

5. Submontane society, restricted to the wooded lower slopes of the mountains, and not extending out into the valley: *Hierochloe macrophylla, Agrostis hyemalis, Pleuropogon refractus, Poa nervosa, P. leptocoma.*

6. Ruderal society, most abundant in waste places, and often associated with cultivated plants: *Echinochloa crus-galli*, *Anthoxanthum odoratum*, *Phleum pratense*, *Agrostis alba*, *Notholcus lanatus*, *Arrhenatherum elatius*, *Avena fatua*, *A. sativa*, *Bromus carinatus*, *B. marginatus*, *B. tectorum*, *B. villosus*, *B. hordeaceus*, *B. secalinus*, *Dactylis glomerata*, *Poa annua*, *P. pratensis*, *P. trivialis*, *Festuca elatior*, *Lolium temulentum*, *L. multiflorum*, *L. perenne*, *Triticum vulgare*, *Hordeum murinum*. Most of the others are either casual and sporadic, or occur indiscriminately in more than one of the above associations.

SALEM, OREGON.

NOTES ON COELOGYNE

BY T. D. A. COCKERELL

Coelogyne is a remarkable genus of palaeotropical orchids, with over a hundred species, distributed from India to the New Hebrides. The type species, *C. cristata* Lindley, comes from the base of the Himalayas, and has beautiful white flowers, the lip marked with orange. The most remarkable thing about the genus is, perhaps, that the lip in some of the species is marked with black. I have before me a number of fresh flowers of *C. pandurata* Lindley, from Borneo. The profuse marking of the pale greenish lip is dull black, with a very faint rusty tint. The small concavity at the extreme base is cinnamon-brown. The other petals, and the long sepals, are pale yellowish green. The column or gynostemium is suffused with apple green, especially at the tip. The bright orange pollinia rest on a broad crenulate or subfimbriate base. The lip is described by Nash* as 2-keeled, but Pfitzer and Kränzlin† treat it as 3-keeled in their key. There is actually a well-developed median keel, but it is smaller than the others. Costantin‡ gives a colored figure of *C. pandurata*, but unfortunately it is colored bright bluish-green, whereas the color should be like that of *Trias oblonga* on the same plate.

* Standard Cyclop. Horticulture.

† Das Pflanzenreich, 1907.

‡ Atlas des Orchidées Cultivées, pl. 25, f. 1.

On examining the black markings of *C. pandurata* under the microscope and in sections, I found that they were entirely superficial, situated on innumerable closely placed small papillae. By transmitted light they appear brown, and the cinnamon color of the basal depression is doubtless due to the same pigment in dilute form. The pigment gives none of the anthocyanin reactions, nor does it look like anthocyanin. It is soluble in strong alkaline solutions, and produces a cherry-colored liquid. This readily stains paper, but does not change color on drying. Acid almost entirely discharges the brown color. I am indebted to Dr. F. Ramaley for the suggestion that the reactions resemble those of turmeric, derived from *Curcuma* (Zingiberaceae). The pigment in turmeric is curcumin, $C_{14}H_{16}O_7$. It seems evident that *Coelogyne* possesses a closely related though doubtless distinct pigment. Even in species such as *C. speciosa* and *C. asperata*, in which the lip is marked with red or cinnamon, there is probably no anthocyanin at all. Pfitzer and Kränzlin remark that blue or blue-violet colors are lacking in the whole tribe Coelogyninæ, but the genus *Pleione*, to judge from the descriptions, must certainly possess anthocyanin.

In the case of *Coelogyne sparsa* Reichb. f., Ames* quotes a collector to the effect that the flowers are white with lavender spots. This would suggest anthocyanin, but it must be an error, as others found the markings to be light brown or purplish brown.

Boulder, Colorado

BOOK REVIEWS

Rock's Lobelioideae of Hawaii †

The flora of the Hawaiian Archipelago has long been known as one of the most peculiar in the world, not alone for its fantastic forms of relatives of well known plants, but for the large number of species that are endemic there. Its isolation is so

* Orchidaceæ, fasc 2, p. 70.

† Rock, J. F. A Monographic Study of the Hawaiian Species of the Tribe Lobelioideae, Family Campanulaceae. Pp. I–XVI + 1–394. 217 full-page plates. Publication of the Bernice Pauahi Bishop Museum. Honolulu. 20 February, 1919.

complete, the depths of the sea surrounding it so great, that there has been a long continuing opportunity for the fixing of types and the preservation, sometimes almost unchanged from the earliest geological times, of ancient forms of vegetation. From Gaudichaud who wrote in 1826, to Wallace, Guppy, Campbell, and the author of the present volume, this endemic nature of a large part of the flora of the islands, has always been among the chief interests in their studies. That these few little dots in the limitless expanse of the Pacific should contain plants found nowhere else in the world, and such curious plants, has almost dramatic significance in the general scheme of plant distribution in that quarter of the earth.

Mr. Joseph H. Rock, who has studied for years the species and varieties of what he calls the tribe Lobelioideae of the Campanulaceae, has written a monographic quarto volume on these plants that clears up many points of identity which no doubt, have bothered some insular and continental botanists. Such a study, involving comparison with the types, of which there are photographs; delving in the literature, for which there is a bibliography; and settling specific and generic limits, for which, of course, there are keys, must be thorough to be really useful. Those who study the present volume can well understand that these features of the book have been prepared with great care and attention to details. Perhaps such a scholarly work will come as a surprise to those who have noted with not very envious astonishment the effects, no doubt, of the exuberant climate of these islands upon recent botanical production in Hawaii.

Nearly one hundred pages are taken up with a discussion of the affinities of the Lobelioideae of Hawaii with those of their nearest relatives, which, in many cases, are geographically remote. The baccate genera, *Clermontia*, *Cyanea*, *Delissea* and *Rollandia* of American affinity, and the capsular genera *Lobelia*, *Trematolobelia* and *Brighamia*, all woody plants except the latter, comprise the tribe which is synonymous with the family Lobeliaceae, in the islands. These seven genera contain 149 species and varieties, the genus *Cyanea* being larger than all the others combined. It is of interest then that Mr. Rock considers this still

in process of evolution, not, like some of the other genera, decadent, or almost extinct as he shows for *Delissea*. Six of the Hawaiian genera are endemic there, only *Lobelia* being found elsewhere. This highly endemic generic proportion naturally opens up many problems of distribution, "age and area" possibilities, and that part of the volume which discusses these problems is naturally the most readable.

The reviewer recently had occasion to look over two papers on these islands for *Botanical Abstracts* (Nos. 822 and 832, December, 1918) which showed that for Hawaiian ferns and their allies the relationship was mostly with the east apparently because they are unfitted for overseas transportation; while for strand plants, of which there is a high percentage of endemics the affinities seem to be with America. Mr. Rock shows that four of the Hawaiian endemic Lobelioideae, among them the numerous Cyaneas, are related to American genera. Not very closely related, however, as no Hawaiian lobeliaceous genus is actually in America. *Lobelia*, being rather generally distributed, is therefore not significant in this connection.

Of course the main portion of the book is taken up by the keys to species and their description and illustration. There are also discussions of the insect and bird visitors of the plants, flowering season, root systems, altitudinal range, and some account of the cultivated species. The book, then, is truly a monograph in the best sense of that much misused word.—N.T.

PROCEEDINGS OF THE CLUB

Meeting of May 28, 1919

The meeting was held in the Morphological Laboratory of the New York Botanical Garden, beginning at 3:30 P.M., with Vice-President Barnhart in the chair. There were thirteen persons present.

The minutes of the meetings of April 30 and May 13 were read and approved. Mrs. N. L. Britton gave an informal report of the special meeting of the Club in conjunction with the Wild

Flower Preservation Society, which was held at the Mansion of the New York Botanical Garden on May 15 and at which Mr. Stewardson Brown of Philadelphia gave an illustrated lecture.

Dr. N. L. Britton, chairman of a special committee to write a letter of congratulation to Capt. John Donnell Smith of Baltimore on the celebration of his ninetieth birthday, June 5, read a copy of a letter which had been drafted and this report of the committee was accepted by the Club.

Dr. F. W. Pennell, for the Field Committee, referred to the plans for the Memorial Day excursion, in coöperation with the Philadelphia Botanical Club.

Dr. M. A. Howe, for the Editorial Board, referred to a project for publishing the correspondence between John Torrey and Louis de Schweinitz and suggested authorization for its publication in the Club's Memoirs. On motion of Dr. N. L. Britton it was voted to refer the matter to the Editorial Board with power to publish, if the financial means could be secured.

The resignation of Miss Amelia R. Goodlatte, Passaic, N. J., was accepted.

Dr. Britton exhibited the remarkable seed-pods of a *Centrolobium* recently collected in Ecuador by Dr. J. N. Rose.

The announced scientific program consisted of four communications, as follows:

1. "Morphogenesis in *Dictyostelium*" by Dr. R. A. Harper. (No abstract furnished.)

2. Dr. Seaver showed specimens of *Bulgaria globosa* collected by Mrs. H. T. Gussow in the Lièvre woods of Quebec and communicated by Prof. J. H. Faull, of the University of Toronto. While the species has been recorded once from Ottawa, Canada, this is the first living specimen seen by the speaker and so far as he knows only the second record of the species from North America. The American specimens differ from the excellent European illustrations by Schmidel in that the hymenium of the American form is much more expanded. This, however, is thought to be due to a difference in age and is not regarded as of specific importance. In all essential details the American plants seem to be identical with European. The speaker was especially

glad to receive specimens of this plant since a monograph of this group for North America is in process of preparation.

3. "Canadian Arctic Mosses," by Mr. R. S. Williams.

A list made by the speaker enumerates 68 species of mosses collected by various members of the expedition sent out by the Canadian Government, in connection with the Geological Survey of Canada, to the northern coasts of Alaska and British North America in 1913–'16. The genus most largely represented is *Drepanocladus* with 11 species, all sterile; next comes *Bryum* with 9 species, 5 of which are fruiting; all the other genera, 33 in number, are represented by 1 or 2 species except *Dicranum*, of which there are 3, one of which, *D. elongatum*, is in fruit.

The greatest number of species (7) separated out from one collection and growing more or less intimately associated, occurs under no. 60, representing a piece of sod, some 4 by 6 inches on the upper surface, cut out from the tundra on Barter Island, on the coast of Arctic Alaska. The species, all sterile and mentioned in the order of their abundance, the commonest first, are as follows: *Catoscepium nigritum*, *Swartzia montana*, *Drepanocladus brevifolius*, *Bryum neodamense*, *Chrysohypnum stellatum*, *Encalypta brevicolla*, and *Drepanocladus scorpioides*. Under no. 23, a small collection made 50 miles inland from Camden Harbor, Alaska, the following were separated out: *Bryum pallescens*, *Leptobryum pyriforme*, *Mnium affine*, *Drepanocladus aduncus*, and *Rhytidium rugosum*, the *Bryum* and *Leptobryum* bearing fruit. The specimens are sterile unless otherwise stated. One species, *Bryum neodamense*, found in Europe, from the Pyrenees to the Arctic coast, does not seem to have been credited before to America. Another, *Drepanocladus brevifolius*, has been noted from Greenland only, while two others are described as new. The region collected over extends from about 68° to 70° 35′ N. and from the northern Alaska coast eastward to about long. 110° W.

4. "Types of Sterility in the Radish," by Dr. A. B. Stout.

Dr. Stout exhibited living plants of cultivated races of the radish, illustrating three types of sterility as follows: (1) blasting of flowers, (2) self- and cross-incompatibility, (3) embryo abor-

tion after fertilization. A brief report was made of the progress and results of experimental studies on these types of sterility in this species.

After the presentation of the papers, they were discussed briefly by some of the members present.

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

TORREYA

Vol. 19 No. 12

December, 1919

SCROPHULARIACEAE OF THE LOCAL FLORA. V

By Francis W. Pennell

Concluded from November Torreya

16. Buchnera L. Sp. Pl. 630. 1753

Type species, *B. americana* L.

1. Buchnera americana L. l.c. 630. 1753. "Habitat in Virginia, Canada." Based upon Gron., Fl. Virg. 74. 1743, typified by *Clayton 142* from Virginia. Type not verified, but description distinctive.

Flowering in July, fruiting in August and September.

Sandy or sterile loam soil, occasional in the Piedmont Region in the southwestern extremity of our area. Delaware County, Pennsylvania (Williamson School), Lancaster Co. (Pleasant Grove), and in Newcastle Co., Delaware (Centreville). Ranges from Pennsylvania to Florida, southern Ontario, Illinois and Louisiana.

17. Schwalbea L. Sp. Pl. 606. 1753

Type species, *S. americana* L.

1. Schwalbea americana L. l.c. 606. 1753. "Habitat in America septentrionali." Linné had in his herbarium no specimen of this, so that his species is based wholly upon Gron., Fl. Virg. 71. 1743, typified by *Clayton 33* from from Virginia. This from the description of the leaves as lanceolate and the plant as quite pubescent would appear to have been the species now considered.

Flowering from mid-June to early July, fruiting in September.

Sandy soil, usually rather damp, in pineland and about edges of salt-marsh, in the Coastal Plain of southern New Jersey and

[No. 11, Vol. 19, of Torreya, comprising pp. 205–233, was issued 18 Dec., 1919.]

in central Delaware. Ranges from southeastern Massachusetts to Virginia, so is to be expected in eastern Long Island.

18. Castilleja Mutis; L. f. Suppl. 293. 1781

Type species, *C. fissifolia* L. f., of Colombia

1. Castilleja coccinea (L.) Spreng.

Bartsia coccinea L. Sp. Pl. 602. 1753. "Habitat in Virginia, Noveboraco . . . Hort. Cliff. 235." From L., Hort. Cliff. 325. 1737, "Crescit in Virginia, unde delatam communicavit DD. Gronovius," and from Gron., Fl. Virg. 69. 1743, "*Clayt.* n. 293." *Clayton 293*, the type, must be certainly the species here considered.

Rhinanthus coccineus (L.) Lam. Encyc. **2**: 60. 1786.

Euchroma coccinea (L.) Nutt. Gen. N. Am. Pl. **2**: 55. 1818. Type of the genus *Euchroma* Nutt.

Castilleja coccinea (L.) Spreng. Syst. **2**: 775. 1825.

Flowering from late April to early June, and soon ripening fruit.

Meadows and moist grassy slopes, loam or sandy loam, through the Piedmont Region, more frequent westward; in the Coastal Plain occasional in the Middle District of southern New Jersey. Ranges from Maine to Manitoba south to South Carolina and Kansas.

19. Rhinanthus L. Sp. Pl. 603. 1753

Type species, *R. Crista-galli* L., of Europe

1. Rhinanthus Crista-galli L.

Flowering in May and early June, fruiting in late June.

Fields and open places near Stratford, Connecticut. Probably introduced from Eurasia, although said to be native northeastward.

20. Pedicularis L. Sp. Pl. 607. 1753

Type species, *P. palustris* L., of Europe

Stem 6–8 dm. tall, glabrous. Leaves shallowly lobed, the sinuses narrow, the lobes with minute regular crenations. Bracts auriculate near base. Rachis of inflorescence glabrous. Fused sepals of each side terminating in a slightly enlarged crenate foliar tip, glabrous or with a very few long hairs near base. Corolla with truncate apex of posterior

lobes without tooth-like processes. Capsule brown, scarcely exceeding calyx, slenderly beaked. Flowering in late summer. 1. *P. lanceolata.*

Stem 1–3 dm. tall, hirsute, especially above. Leaves deeply lobed, the sinuses broad, the lobes with more prominent irregular crenations. Bracts entire near base. Rachis of inflorescence lanate. Fused sepals of each side broadly acute, entire, pubescent along the veins. Corolla with apex of posterior lobes each with a tooth-like process. Capsule straw-colored, twice as long as the calyx, scarcely beaked. Flowering in spring. 2. *P. canadensis.*

1. PEDICULARIS LANCEOLATA Michx. Fl. Bor. Am. **2**: 18. 1803. "Hab. in regione Illinoensi [*A. Michaux*]." Type not verified, but description distinctive.

Pedicularis auriculata Sm. in Rees Cycl. **26**: 1813. "Sent by the Rev. Dr. Muhlenberg, from the neighborhood of Lancaster in Pennsylvania." Description distinctive.

Pedicularis pallida Banks; Pursh, Fl. Am. Sept. 424. 1814. "In a swamp near Kings-bridge, New York. . . . *Ph.* [= *Pursh*] . . . v.v.; v.s. in Herb. Banks." Description distinctive.

Flowering from late August to late September, fruiting late September and October.

Swales and moist meadows, loam soil, in the Piedmont region, more frequent southwestward; occasional in the Middle District of the Coastal Plain of southern New Jersey, extending nearly to Cape May. Ranges from Massachusetts to Manitoba, North Carolina and Nebraska.

2. PEDICULARIS CANADENSIS L. Mant. 86. 1767. "Habitat in America septentrionali. *Kalm.*" Description distinctive.

Pedicularis gladiata Michx. Fl. Bor. Amer. 2: 18. 1803. "Hab. in Pennsylvania [*A. Michaux*]." Description quite distinctive.

Flowering from late April to late May, fruiting in late May and early June.

Woodland, or on knolls in meadows, loam or sandy loam, common throughout above the Fall-Line; in the Coastal Plain frequent or occasional in Long Island and in the Middle District of southern New Jersey. Ranges from Nova Scotia to Manitoba, south to Florida and Texas.

21. Melampyrum L., Sp. Pl. 605. 1753

Type species, *M. cristatum* L. of Europe

Main stem-leaves linear or lanceolate-linear. Bracts conspicuously fimbriate near base, with teeth frequently as long as the width of the blade. Capsules mostly 6–7 mm. long, curved and usually attenuate-beaked. Seeds 2–2.5 mm. long, brown to blackish. 1. *M. lineare.*

Main stem-leaves linear-lanceolate to nearly ovate. Bracts slightly or not fimbriate near base, the teeth shorter than the width of the blade. Capsules frequently larger, reaching 8–9 mm. long, slightly or not curved and less or not attenuate-beaked. Seeds often larger, reaching 3 mm. long, usually black. 1a. *M. lineare latifolium.*

1. Melampyrum lineare Desr.; Lam. Encyc. **4**: 22. 1796. "Rapportée de la Caroline par M. Fraser . . . (v.s.)" Description made from a very small and young plant, but certainly of the form here considered. Characterization of calyx as 5-toothed surely erroneous.

Flowering from mid-June to September, and soon ripening fruit.

Sandy soil, pineland and in open deciduous woodland, common throughout the Coastal Plain; inland occasional and mostly transitional to var. *latifolium*. Ranges from Massachusetts to North Carolina, and, including varieties, inland northward across the continent.

1*a*. Melampyrum lineare latifolium (Muhl.) Beauverd

Melampyrum americanum Michx. Fl. Bor. Amer. **2**: 16. 1803. "Hab. a sinu Hudsonis ad montosam Carolinam. [*A. Michaux*]." Description evidently of the prevalent inland broader-leaved plant.

Melampyrum latifolium Muhl. [Cat. 57. 1813. *nomen nudum*]; Eaton, Man. Bot. N. & M. St. ed. II 316. 1818. From Muhlenberg's Catalog, the type station is in Delaware. Type not seen, but evidently is of the inland broader-leaved plant.

Melampyrum americanum latifolium (Muhl.) Eaton, l.c. ed. III. 350. 1822.

Melampyrum pratense americanum (Michx.) Benth. in DC. Prod. **10**: 584. 1846.

Melampyrum lineare latifolium (Muhl.) Beauverd in Mem. Soc. Phys. Genève **38**: 474. 1916.

Melampyrum lineare americanum (Michx.) Beauverd, l.c. 476. 1916. Beauverd distinguishes *latifolium* with bracts broader, the lower entire, the upper entire or few-toothed, and the first flower placed at the third or fourth node, from *americanum* with bracts narrower, the lower entire or slightly toothed, the upper always toothed, and the first flower in the axil of the fourth to eighth node. His *americanum* is transitional from *latifolium* to *lineare* itself, from which he distinguishes both these varieties as having corolla whitish, tinged with purple, instead of pale-yellow, tinged with purple. The corolla of the species, as well of var. *latifolium* as I understand it, has the corolla white, posteriorly more or less tinged with red, especially in age, and only the palate yellow. His color distinction cannot be maintained, and I should consider the broadest, most entire-leaved plants as an extreme of this variety.

Flowering from late May to mid-August, and soon ripening fruit.

Dry open woods, in potassic soil, sandy or sterile, locally common on sandstone or shale ridges, etc., throughout the area above the Fall-line; in the Coastal Plain occasional on Long Island and in the Middle District of southern New Jersey. Intergrading to the species.

Local Specimens of the Author's Collecting

As my own collections illustrating our local species of Scrophulariaceae in part have already been, and in part are soon to be, distributed to various herbaria, it may be well here to present a summary of the numbers of these. The specimen numbers will be grouped by species and states. All are from the local flora as defined in the introduction to these studies.

Agalinis acuta (N. Y.) 5292, 6551, 6552, 9340, 10126.

Agalinis Holmiana (N. Y.) 10167. (N. J.) 1662, 2695, 3544, 3583, 3628, 6483, 9117.

Agalinis maritima (N. Y.) 9359. (N. J.) 1807, 2157.

Agalinis purpurea (N. Y.) 5291, 6549, 6647, 9366, 10146. (N. J.) 2602, 2603, 2604, 4004, 6492, 6524, 6637, 9294. (Pa.) 476, 750, 786, 838, 847, 1660, 2682, 2689, 3598, 3609, 5182, 5272, 8984.

Agalinis tenuifolia (Conn.) 8578. (N. Y.) 6651, 6698, 9226. (N. J.) 1664, 6534, 9870. (Pa.) 658, 837, 1642, 2681, 2688, 2690, 3543, 5289, 8906.

Agalinis virgata (N. J.) 2692, 2694, 3584, 3626, 3808, 6521, 6523, 9114.

Aureolaria flava (N. Y.) 5293, 8434, 9407. (N. J.) 8358. (Pa.) 3541, 3624, 5225, 5260, 5284, 5286, 6791.

Aureolaria pedicularia (N. Y.) 9225, 10171. (N. J.) 10040. (Pa.) 583, 991, 1948, 3542, 3559, 3585, 3589, 3625, 5192, 5226, 5261, 5262, 5265, 5288, 8831, 8860. (Del.) 1519. (Md.) 1619.

Aureolaria pedicularia caesariensis (N. J.) 1837, 3545, 3627, 6487, 9155.

Aureolaria pedicularia intercedens (Pa.) 676, 4982.

Aureolaria virginica (N. Y.) 5294, 6868, 8459. (N. J.) 3546, 3986, 6489, 7363, 7428, 8345, 9208. (Pa.) 337, 4985, 5021, 5067, 5227, 5259, 5283, 6503, 6793, 7850, 7912, 8847, 9412. (Del.) 7754. (Md.) 1615.

Castilleja coccinea (Pa.) 1290, 2034, 2772.

Chelone glabra (N. Y.) 6643, 6678, 6745, 6833, 6898, 8604, 9239, 9308, 9397, 9400. (N. J.) 6485, 6525, 6543, 9223, 9224. (Pa.) 6794.

Chelone glabra f. *tomentosa* (Pa.) 901, 6480, 8827, 8861, 8912.

Gratiola aurea (N. J.) 6500, 6527, 9929.

Gratiola aurea obtusa (N. J.) 9897.

Gratiola neglecta (Conn.) 8579. (N. Y.) 9930. (N. J.) 7367, 9445. (Pa.) 1495, 2822, 5013, 6477, 6994, 7256, 7861.

Gratiola pilosa (N. J.) 6486, 6491.

Gratiola virginiana (N. J.) 6495.

Hemianthus micranthus (N. J.) 6497.

Ilysanthes dubia (N. Y.) 6704 p.p., 8429. (N.J.) 6493. (Pa.) 6467, 6474 p.p., 8014, 8837.

Ilysanthes dubia inundata (N. J.) 6496.

Ilysanthes inaequalis (N. Y.) 6704 p.p. (N. J.) 3987, 6494, 6636. (Pa.) 6474 p.p.

Limosella subulata (N. J.) 6635.

Linaria canadensis (N. Y.) 7747, 10143. (N. J.) 6488, 6520, 6971, 6972, 8182, 9438, 10012, 10021, 10077. (Md.) 8882.

Linaria Linaria (N. Y.) 6699, 7014, 7679, 8710. (N. J.) 6526, 6548, 7408. (Pa.) 7303, 7968. (Md.) 8881.

Melampyrum lineare (N. J.) 3572, 3818, 3836, 6499, 6522, 6587, 8167, 9050. (Pa.) 1883, 6481.

Melampyrum lineare latifolium (N. Y.) 6795, 6798, 8440. (N. J.) 7429, 9219, 9460, 10010, 10054, 10118. (Pa.) 1561, 6501, 6795, 7880, 7956, 8852.

Mimulus alatus (N. Y.) 7683, 8209.

Mimulus ringens (N. Y.) 6550, 6642, 6683, 7636, 8687, 9190, 9305. (N. J.) 6537. (Pa.) 6472, 6476, 6502, 7857, 7889, 8028, 8842, 8958.

Otophylla auriculata (Pa.) 5229, 5230, 5285, 5290.

Pedicularis canadensis (N. Y.) 2386, 6761, 6823, 6905, 7153, 8433, 9951, 9968, 10141. (N. J.) 6974, 9995. (Pa.) 2612, 6792, 8753.

Pedicularis lanceolata (Pa.) 1839, 6469.

Penstemon Digitalis (N. Y.) 9423. (Pa.) 6471.

Penstemon hirsutus (N. J.) 7409. (Pa.) 3645, 6716, 7006.

Penstemon pallidus (N. Y.) 7130.

Schwalbea americana (N. J.) 9028, 10086.

Scrophularia leporella (N. Y.) 6790, 6888, 6910, 7732, 8323. (N.J.) 10098. (Pa.) 4993.

Scrophularia marilandica (N. Y.) 8220. (N. J.) 9904. (Pa.) 6468, 6504, 8108.

Verbascum Blattaria (N. J.) 7053. (Pa.) 6475, 7971.

Verbascum Lychnitis (Pa.) 6478.

Verbascum Thapsus (N. Y.) 6684, 8324, 8496. (Pa.) 6479, 7970.

Veronica americana (N. Y.) 6824, 6887, 7186, 7740. (N. J.) 6533, 9437. (Pa.) 5069, 7238.

Veronica arvensis (N. Y.) 6787, 6867. (N. J.) 7062, 9993. (Pa.) 6719, 6999, 7254.

Veronica Brittonii (N. J.) 10100.

Veronica Chamaedrys (N. Y.) 6768.

Veronica officinalis (N. Y.) 6880, 7023, 7118, 7623, 8423. (N. J.) 6528, 7414. (Pa.) 6718, 7965.

Veronica peregrina (Pa.) 6995.

Veronica scutellata (N. Y.) 6641.

Veronica serpyllifolia (N. Y.) 6788, 6830, 6911.

Veronica Tournefortii (Pa.) 6466.

Veronicastrum virginicum (N. Y.) 7731, 8697, 9851. (N. J.) 6529, 10104. (Pa.) 373, 4980, 4981, 6470, 7778, 8003, 8082, 9000, 9016.

Additions and Corrections

Page 111, line 19.—Delete word "persistent." The tubercle-like base of the style lasts but a short time after anthesis, not until the fruit is mature.

Page 111, last line.—VI. Veroniceae, not "Digitaleae."

Page 112, line 9.—Add word "usually" before "parasitic."

Page 112, line 19.—Add word "one" so as to read "Two stigmatic lines, one down each side of style-apex."

Page 112, line 22.—Add to characterization of genera contrasted with *Buchnera*, "Calyx not bracted at base."

Page 113, line 12.—Add to characterization of *Buchnera*, "Calyx bibracteolate at base."

Page 113, line 19.—Add to characterization of *Schwalbea:* "Calyx bibracteolate at base."

Page 113, line 22.—Add to characterization of genera contrasted with *Schwalbea*, "Calyx not bracted at base."

Page 114, line 10.—Add phrase "to four" so expression reads "Seeds maturing two to four to a capsule."

Page 152, line 13.—Add "*Linaria canadensis* occurs occasionally in a pink-flowered form."

Page 168.—13. *Veronica Brittonii* Porter and Page 170.—14. *Veronica glandifera* Pennell. It should have been stated that both these newly described species are segregates from the complex known as *Veronica* Anagallis-aquatica L. This name belongs to some one of several Palaeartic species, all of which differ from our plants.

THE OCCURRENCE AND DISTRIBUTION OF VASEY'S PONDWEED IN NORTHEASTERN OHIO

By L. S. Hopkins

So far as available records show the first collection of this interesting little pondweed—*Potamogeton Vaseyi* Robbins—was made at Brady's Lake, Portage Co., by the writer on June 22, 1912, it being in flower at the time.

The fact that the plant was new to me at the time of its collection signified little since I had given no attention to the members of this genus. Moreover it occurred in such abundance that I never surmised that it had not been collected before and it was not until later that I learned that this was the first authentic account of its occurrence in the state.

It has since been collected by Mr. John Bright of Glenshaw, Pa. at the mouth of Cowles Creek, near Geneva-on-the-Lake in Ashtabula Co. on July 28, 1918, and by myself in August, 1918, and again in 1919 at Sandy Lake (also called Lake Stafford), Portage Co.

Although the Gray's New Manual, 1908, page 76, gives its distribution as being from "Me. to Ont., s. to Ct., N. Y., O., Ill., and Minn.," Schaffner does not include it in his "Ohio Catalogue of Vascular Plants."

Brief comment may be made upon two statements commonly made in connection with this plant. The first is found in Britton and Brown's Illustrated Flora, 1913, page 83 to the effect that "emersed fertile forms (occur) in shallow water." The other is found in the Gray's New Manual, which states that the "fruiting form with floating leaves (is)rare."

With reference to local material as studied at the lakes mentioned, it seems worthy of note that it does not agree with the manuals quoted in three essential particulars.

1. Fruiting stems are not rare. On the contrary they are very abundant. It is no exaggeration to say that enough fruiting stems to fill an ordinary row boat could have been collected at Sandy Lake in August, 1919.

2. Unless the term "floating leaves" is used merely to distinguish the larger leaves from the smaller it is a misnomer, for they do not always float. Thousands of these "floating leaves" were seen in 1918 and again in 1919, which by actual measurement, were submerged at varying depths up to twenty inches.

3. Fruiting stems are not limited to shallow water. It produced fruit abundantly at Sandy Lake in 1919 in water of such depth that the combined length of an ordinary oar—6 ft. 6 in.—and my arm with the sleeve rolled up as far as I could get it did not suffice to reach the bottom. In this particular lake for the past two seasons it has fruited most abundantly in water over six feet deep.

As northeastern Ohio abounds in small lakes it is not improbable that other stations for it will be discovered.

Several sheets of herbarium material were prepared from specimens collected at Sandy Lake and will be given to any one who may care to send postage for it.

State Normal College,
Kent, Ohio.

SHORTER NOTES

Carpolithes macrophyllus a Philadelphus.—In Torreya, 1911, p. 235, I described a fossil fruit from the Miocene of Florissant, giving it the name *Carpolithes macrophyllus*, and leaving its classification uncertain. I now find that it agrees in every particular with *Philadelphus*, except that the sepals are longer than in any living species known to me. It must be called *Philadelphus macrophyllus*, but it very likely belongs to the same species as *P. palaeophilus* Ckll. 1908, based on leaves from the same rocks.—T. D. A. Cockerell

REVIEWS

Flora the District of Columbia*

Washington botanists are to be congratulated upon the publication of this important contribution to the regional botany of eastern North America, containing, as it does, the record of an

* Hitchcock, A. S. and Standley, P. C. With the assistance of the botanists of Washington, Flora of the District of Columbia and Vicinity. Contribution U. S. Nat. Herb. **21**: pp. 1–329. *pl. 42*. 1919.

immense amount of original observation by many students over many years. There is a brief introduction, describing the geographic, geologic, and ecologic aspects of the area, which is in a general way a circle of fifteen miles radius with the Capitol as the center and which has yielded 1,630 species of native and naturalized plants here formally listed, with records of habitat, distribution, and common names. Numerous other species, found adventive or as waifs are mentioned in notes and there are occasional critical comments on relationship, morphology, uses and other features.

The Catalogue is preceded by a key to the families based mainly on vegetative characters and by another key to the families based mainly on floral characters, these two keys occupying 30 pages of the book, and they have been very ingeniously worked up; there is a generic key for each family and a species key for each genus. The families have not been grouped in orders, which is to be regretted. As a rule, the keys are detailed and complete enough to effect the determination of species, assuming a general knowledge of the flora by the student using the work. Varieties or races are very sparingly admitted and the recognition of species is commendably sane. Thus only seven species of *Crataegus* are listed, only 6 *Rubi*, only 3 Lacinarias, and only 6 Antennarias, with an apology for one of them. *Oenothera biennis* is very properly disposed of as "an extremely variable species . . . considered to consist of numerous 'elementary species.'" Generic ranks are for the most part liberally recognized, perhaps not in all families consistently, this doubtless referable to the very considerable number of collaborators (twenty-two). It would be most unfortunate to have anything like that number of students of the same turn of mind; thus *Padus* is not separated from *Prunus*, while *Persicaria* is kept out of *Polygonum*.

A few generic names replace those in ordinary usage, as *Bilderdykia* for *Tiniaria* and *Campe* for *Barbarea*, having priority of publication. Several specific names are likewise strangers, due to bibliographic research and the more correct application of names to type-specimens, noteworthy those ferreted out by

Dr. Blake in his studies of Linnaean species while in London a few years ago. One of these I have supposed might be based on some ancient error or mixture; that is the application of the name *Eleocharis capitata* to what we have long been calling *Eleocharis tenuis;* it seems incredible that Linnaeus could have meant to describe the spikelet of that sedge as subglobose and to have assigned the name *capitata* to it. Linnaeus reached some results which seem queer to us, like his classifying *Lysimachia terrestris* as a Mistletoe and *Comptonia peregrina* as a *Liquidambar*, but these flukes are brilliant as compared with calling the spikelet of *Eleocharis tenuis* subglobose.

It goes without saying that the nomenclature of the District Flora follows the American Code, rather than the so-called International Code forced down the throats of the Vienna Botanical Congress by a German majority and further manipulated by the same majority at the Brussels Congress; we can well understand why the French have never recognized it as valid, and why anybody but Germans or Austrians should so regard it has always been a puzzle, especially as the American Code is much more logical and cuts out autocracy. Internationalism is proving a dangerous principle to play with, and in many aspects has much to condemn it.

The Washington botanists have followed the American Code consistently in almost every item except the use of duplicate binomials; they do not say why these have not been used; zoölogists have used them for many years without losing sleep, and *Sassafras Sassafras* runs well with *Corvus Corvus*. We must, I suppose, conclude that our colleagues of the fifteen-mile circle around the national Capitol, or most of them, simply do not like to say *Catalpa Catalpa*, although by refusing such diction they lose the valuable suggestion that Linnaeus named the tree *Bignonia Catalpa*. Or may it be that they are influenced by the line of thought advanced by Engler at the Vienna Congress when we asked him why he objected and he told us principally that such names had made some of his students laugh! And so the risibility of juvenile Huns prevented their adoption at that highly amusing convocation.

N. L. Britton.

PROCEEDINGS OF THE CLUB

October 14, 1919

The meeting was held in the lecture room of the Department of Botany, Columbia University, President Richards presiding. There were seventeen persons present.

The minutes of May 28 were read and approved.

The following persons were nominated and elected to membership: Mr. Hilary S. Jurica, St. Procopius College, Lysle, Illinois; Mr. Frederick Kobbé, 103 East 86th St., New York City; Miss Ella McNeier, 260 Convent Ave., New York City; Mr. Charles Brown, 762 Courtlandt Ave., New York City; Mrs. D. W. Johnston, 206 East 200th St., New York City; Miss Nessa Cohen, 2094 Fifth Ave., New York City; Miss Marguerite Gluck, 2010 Seventh Ave., New York City.

Dr. Seaver called for suggestions regarding the programs for the evening meetings of the Club.

The announced program called for reports by members on their summer work.

Professor R. A. Harper exhibited a number of very excellent photographs of species of Boleti collected at various times during the summer in the vicinity of Woods Hole, Mass.

Dr. M. A. Howe gave a brief account of the life of C. C. Frost mentioned by Dr. Harper. He also spoke of his own work in connection with the establishment of the dahlia border at the New York Botanical Garden. He has obtained for the garden some 343 varieties of dahlias.

Dr. H. B. Douglas remarked on the various species of Boleti he had collected in Maine.

Professor T. E. Hazen spoke of his work on the Pontederias at Woods Hole. He had gathered nineteen plants from the field and transplanted them successfully in a small pond where they could be studied and photographed conveniently. He showed a number of pictures, using his negatives as lantern slides as his pictures had not been finished.

Mr. A. T. Beals spoke of collecting mosses during the summer. His material has not been worked over as yet but contains many interesting species.

B. O. Dodge exhibited a few photographs of *Gymnosporangium*, *Sporodinia* and *Exobasidium* which had been taken at Woods Hole by Professor Harper, Professor Hazen, and himself.

Professor Richards exhibited several beautiful specimens of *Buellia geographica* which he and Mrs. Richards had collected at Glacier Park, Montana, during the summer. The gas analyses which he had been making during the summer have not been completed sufficiently to warrant reporting at this time. He also exhibited a large specimen of *Calvatia gigantea* collected recently in this vicinity.

Adjournment followed.

B. O. Dodge, *Secretary*.

NEWS ITEMS

At the St. Louis meeting of the Ecological Society of America *The Plant World* was taken over by the Society and will be merged with *Ecology*, a new journal which will be issued as the official organ of the Society.

Beginning with volume 20 Torreya will be issued bi-monthly. This has been decided because of the greatly increased cost of production. As heretofore its pages will be open to all who have something to say of interest to botany, but if more material is offered for publication than we have room for, preference will be given to members of the Club, and to notes on local botany.

DATES OF PUBLICATION

No. 1,	for January	Pages 1–20	Issued	February	21, 1919
No. 2,	February	21–36		March	19, 1919
No. 3,	March	37–56		May	14, 1919
No. 4,	April	57–84		June	25, 1919
No. 5,	May	85–105		July	9, 1919
No. 6,	June	107–124		August	7, 1919
No. 7,	July	125–142		September	10, 1919
No. 8,	August	143–160		September	17, 1919
No. 9,	September	161–185		October	28, 1919
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No. 12,	December	235–257		January	22, 1920

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[The names of species and varieties described as new and of new combinations are in **bold face type.**]

TORREYA

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JOHN TORREY, 1796–1873

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BY

NORMAN TAYLOR

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TORREYA

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TORREYA A BI-MONTHLY

Until further notice TORREYA will be issued bi-monthly. It is to be regretted that greatly increased costs have made this necessary and it will be continued in its present form only so long as the conditions which have caused its curtailment persist. The income for its publication could be greatly increased by adding to the subscribers and members, and those interested in putting TORREYA on its monthly schedule will hasten that time by actively pushing a campaign for new members and subscribers.

For the present, manuscripts and reviews submitted for publication will be printed as soon as possible, but papers by members of the Club will be given precedence over others, if our columns become crowded. Preference will usually be shown, also, to papers on local botany, especially those on the distribution of vegetation within the Local Flora Area.

[No. 12, Vol. 19 of TORREYA, comprising pp. 235–257, was issued 26 January 1920]

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FEBRUARY, 1920

Note: It is more than thirty years since a list of the members of the Club has been published in our own publications. If there are any errors, it is requested that a note regarding them be sent to the Secretary, Dr. Francis W. Pennell, 2764 Creston Ave., N. Y. City.

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SOIL PREFERENCES OF SCROPHULARIACEAE

By Francis W. Pennell

Fifteen times during the course of my series of articles on the "Scrophulariaceae of the Local Flora," which appeared in Torreya during 1919, have I made the same mistake—an error which to a person with a chemical knowledge of soils may appear glaring. One correction will serve for all: for "potassic soil" read "non-calcareous and non-magnesian soil."

It is easy for those of us who are interested in plant-identity and plant-distribution to realize that for each species there is a soil of optimum chemical composition as well as one of optimum physical composition. The writer's first original scientific study was an analysis of the flora of the Serpentine Barrens of extreme southeastern Pennsylvania, and there, on soil identical in texture with that of other barren hills of the section, the Serpentine would present invariably its definite alliance of inter-growing species—certainly the obvious explanation was the presence in the soil of magnesium as a preponderant element. With nearly equal sharpness one may denote the species growing upon soils with calcium as the main determining element. Other soils may not so readily be disposed into like groups, yet the remaining aggregate possesses so much in common that for it, and especially—most wrongly—for a pronounced part of it, "acid soils," have I used the term "potassic."

My present word of correction would emphasize the importance of our local workers' studying the problem of soil-preferences of plants, and giving us just the information which my papers intended to give. The ideal Local Flora of the future will present a classification of the flora into sub-floras and associations, accounting for the distinctness of each type; also it must give

us an account of each species, surely with less attention to its nomenclature and history than the formative state of our science now makes desirable, but rather telling of its life—of its "preference" with respect to food, to texture of soil, to moisture, to light, of its manner of pollination, of its range—both portraying and explaining this—and adding yet much more to that wealth of information which an observational field-botany should make ours.

Soil-chemistry is too fundamental for plant-distribution for me to feel that this misstatement really deserves the pardon for which I am asking.

New York Botanical Garden

BOOK REVIEWS

Murrill's Nature Books*

These three books complete the set of nature and character books published by Dr. Murrill during the past year, making a total of about 1,000 pages of text, 129 halftones, and 5 colored plates. The first of the series was reviewed in Torreya for November, 1918.

In all these volumes, which are largely autobiographic, the author seeks to educate and inspire both young and old in a pleasing, indirect way that is quite original.

"The Naturalist in a Boarding School" contains the author's experiences while teaching at Bowling Green and Staunton, Virginia; short essays on various subjects; a condensed guide to bodily and mental health, character training, original epigrams and maxims on a great variety of subjects, and classified quotations from the best literature relating to man; the latter feature consisting of quotations reaching from Epictetus to Emerson and beyond—over 100 pages!

"The Natural History of Staunton" contains many original observations on all phases of natural history—beasts, birds, trees, flowers, rocks, etc.—with colored figures of the more common butterflies and a list of nature quotations.

* "The Three Young Crusoes." The Naturalist in a Boarding School." "The Natural History of Staunton, Virginia." Written and for sale by William Alphonso Murrill, Bronxwood Park, New York, $1.50 per volume, postpaid.

"The Three Young Crusoes" is all about three children wrecked on a fabulous West India island, what they saw there and what they learned by the experience.

In Billy the Boy Naturalist, reviewed in an earlier number of TORREYA, the author's gift for seeing things from the boy's point of view was noted as one of the merits of the book. In the last three volumes this gift is somewhat obscured by a mass of quotations, maxims, and epigrams, selected and composed with a catholicity of taste that would stun the average boy. Epigrams and maxims too, however piquant to grown-ups may not be always *virginibus puerisque*.

Writing books like these, even for children, involves an astonishing willingness for self-revelation on the author's part, for it sweeps away some of the reticences of our Anglo-Saxon tradition. While most of us may have passed through the phases of youth upon which the author dwells with such particularity, few have the courage to disclose them. To alter slightly a phrase of Stevenson, who in rare degree understood writing for children, some of us might think that while we are quite capable of writing books like these we prefer not to write them. But the preferences of adults with Anglo-Saxon reticences, who may object to the books, is not likely to weigh much against them so far as children are concerned. And for young people there is in them an undeniable fund of information on natural history.

THE EDITOR.

PROCEEDINGS OF THE CLUB

OCTOBER 29, 1919

The meeting was held in the Morphological Laboratory of the New York Botanical Garden at 3:30 P.M., Vice-President Barnhart presiding. There were twenty-eight persons present.

The minutes of the meeting held October 14 were read and approved. Dr. Isaac Levin, Mr. Arthur H. Thomas, were nominated for membership.

Dr. Britton spoke of the completion of the new greenhouse presented to the New York Botanical Garden by Messrs. Daniel

and Murry Guggenheim, and suggested that the Club hold a Field meeting at the time of the formal opening of this green house, Saturday, November 8, and also at the lectures to be held the three following Saturday afternoons at the green house. On the motion of Dr. Britton, the chairman of the Field Committee was directed to make the announcements in the Bulletin of the New York Academy of Sciences.

Mrs. Britton mentioned communications which she and the Secretary of the Club had received from a former Secretary, Mrs. B. LeBrun, regarding the sale of certain water colors done by Mrs. Ranseur. These illustrations were exhibited to the Club.

Prof. Harper spoke of the opportunity to hear a lecture on the flora of New Zealand in view of the fact that the program committee had secured the consent of Professor A. H. Cockayne, of the Agricultural Department of New Zealand, to lecture on the Tuesday evening meeting, November 11.

The Secretary read a letter from Mr. George L. Moxley, of 5417 Santa Monica Boulevard, Los Angeles, Calif., regarding the exchange of the Club's publications for specimens which he was now collecting and preparing. The letter was referred to Dr. Britton with power.

The election of Dr. Levin and Mr. Thomas followed.

Dr. Britton exhibited an interesting specimen of a species of Sedge, which consisted of a fruiting mass subtended by the involucral bracts of a leaf. This sedge, a *Scirpodendron*, a native of the Philippines and other Eastern Islands, is probably the largest sedge in the world.

Mrs. Britton spoke of the late blooming of *Rhododendron catawbiense* in the New York Botanical Garden and stated that the Japanese quince and lilacs were also in bloom. Dr. Harper also noted that pears were in bloom at the Columbia campus.

Dr. Marshall A. Howe, in directing attention to several bouquets of dahlias, remarked that the Botanical Garden's dahlia border was enjoying an unusually successful season, due perhaps to the fact that the rainfall during the summer and autumn had been about five inches in excess of the normal. About 340

varieties, represented by somewhat more than 600 plants, had reached the blossoming stage. Attention was directed especially to the variety *Juarezii* which is supposed to represent rather accurately the original "cactus" dahlia as first known in Europe in 1872.

The Scientific program as announced was as follows: Dr. John H. Barnhart, "Wooden Flowers"; Dr. William A. Murrill, "Notes on Fungi"; Dr. Francis W. Pennell, "Field Excursions"; Dr. P. A. Rydberg "Notes on *Philotria*." The following extracts were furnished by the speakers.

"Dr. Barnhart exhibited two fine specimens of 'wooden flowers' recently presented to the museum of the New York Botanical Garden by Dr. L. A. Wailes of New Orleans, and remarked upon the cause of these curious malformations. They are found in Central America, where they are known to the natives as 'flor de madera' or 'flor de infierno.' They may be classified as galls and are perhaps the only known kind of galls produced by parasitic flowering plants; being the modification produced in host-tissues by the base of a mistletoe of the genus *Phoradendron*, this modification persisting after the parasite had dropped from the host. Several good published illustrations of the structure were shown."

"Collecting Fungi in Virginia."

"During the latter half of July 1919, the writer made a tour through parts of southwest Virginia, returning by way of Blue Ridge Springs, Bedford City, Lynchburg, and Falls Church. A drought early in the month was followed by over a week of rain, which brought out an unusually large and diversified crop of fungi. These were studied and collected for several days in the vicinity of Blacksburg, Virginia, at an elevation of 2,200 feet, where the woodlands are mostly oak-chestnut and the rocks Trenton limestones or subcarboniferous shales and sandstones.

"Trees were attacked by destructive polypores, among them *Bjerkandera adusta*, *Coriolus versicolor*, *Daedalea quercina*, *Elfvingia lobata*, *Fulvifomes Robiniae*, *Grifolia Berkeleyi*, *Laetiporus speciosus*, *Porodaedalea Pini*, *Trametes robiniophila* and *Tyromyces Spraguei*. The most abundant of these were prob-

ably *Fulvifomes Robiniae* on black locust and *Elfvingia lobata* on various species of oak, hickory, and maple.

"Of the fleshy forms that were eaten, the following might be mentioned: *Chanterel Chantarellus, Craterellus cornucopioides, Lycoperdon cyathiforme, L. gemmatum, Cortinarius semisanguineus, Vaginata plumbea, Lactaria volema, L. corrugis, Hydnum repandum, Boletus bicolor, Pluteus cervinus,* and *Hypomyces lactifluorum.* Those specially avoided where species of *Venenarius* and brilliant clusters of *Clitocybe illudens.*"

"One of the most interesting observations was made at Lynchburg at the corner of Tenth and Harrison Streets. Here stood an English Walnut tree over a hundred years old, which measured seven feet in circumference and about sixty feet in height, and had borne quantities of good nuts until about 1915. Since then, however, the nuts had been diseased and for the most part worthless. Upon closer examination, some of the green fruits hanging on the tree were seen to be partially blackened, while many entirely blackened and decayed fruits were on the ground. This walnut blight, *Bacterium juglandis*, has been known since 1900 on the Pacific coast, where it is considered a most serious disease and one not amenable to treatment."

"Dr. Pennell gave a résumé of the work done by the Field Committee in connection with the summer's field excursions. He pointed out some of the difficulties of the situation and urged a more hearty cooperation of the members of the club in the future. The club voted to refer the questions to Dr. Pennell with the request that he make further recommendations for consideration at the Annual meeting."

"Dr. Rydberg presented some notes on *Philotria.* In the eastern species, the stamiate flowers have been described as having oblong or elliptical petals and break loose from the short pedical to float on the surface during pollination. Mr. R. Hitchcock of Ithaca had sent in some specimens collected in Lake Cayuaga, in which the petals are narrowly linear and the pedicels elongate so that the flower reaches the surface before it breaks loose. In these respects the specimens agreed with *P. iowensis* Wylie, which hitherto had been found only in Iowa

and in a pond near Denver, Colorado. Some peculiarities in the pistillate flowers were also pointed out."

Adjournment followed. B. O. Dodge,
Secretary.

NEWS ITEMS

At a dinner for botanists given by the Missouri Botanical Garden during the St. Louis meeting two rather unusual vegetables were served. *Dasheen en cassorole* and *Arracacha.* The latter is a Venezuelan plant, *Arracacia xanthorrhiza*, introduced through the Foreign Seed and Plant Introduction Office at Washington, and said to be the first grown in the United States and served at a public banquet. The dasheen is *Colocasia esculenta*, a more familiar plant, grown commercially from South Carolina to Florida and Texas, but not yet widely known near New York.

The Ecological Society of America elected the following officers at the Christmas meetings. *President*, Barrington Moore; *Vice-President*, G. E. Nichols; and *Secretary-Treasurer*, A. O. Weese. The president was reelected and, after a several month's trip to the Southwest and California, will be at 925 Park Avenue, N. Y. after March 27.

Dr. R. M. Harper, after a short visit to New York, has returned to Alabama. His address until further notice will be University, Ala.

Dr. B. E. Livingston, of Johns Hopkins University, has been appointed Permanent Secretary of the American Association for the Advancement of Science. He will retain his position at the University and spend one or two days a week at Washington.

Mr. Robert Cushman Murphy has just returned from the islands off the coast of Peru. While most of his material is zoological he collected all the flowering plants known from the islands. Some are absolute deserts, a few with only lichens and mosses, others with as many as 15 flowering plants. One island contains a fringe of a single beach species along the coast, then for 1000 feet in elevation nothing but bare rock and soil, and finally a single specimen of an Acacia-like tree, not over 3 feet high. The specimens from these unique islands have been presented to the Brooklyn Botanic Garden.

TORREYA

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March–April, 1920

SOME LOCAL NAMES OF PLANTS—III*

By W. L. McAtee

The present contribution to an enumeration of the local names of American plants is compiled from several sources. It includes names learned by the writer on field trips, both official and personal, others kindly contributed by friends (to whom credit is given in connection with the names), local terms gleaned from herbarium sheets and a few from old books. In the latter case opportunity was taken to rescue from apparent oblivion the more interesting plant appellations contained in the Arctic Zoology (T. Pennant, 1785) and in Travels in the Confederation (1783–4, Schoepf, J. D., translated by Alfred J. Morrison, 1911).

Whenever possible the locality where each name is or has been used is cited. Like previous contributions this list is numbered and indexed. As a point of interest, it may be mentioned that of the 95 specific groups of plants catalogued 52 were named by Linnaeus. Original authorities for names only are cited, and except in the case of Linnaeus are spelled out.

Polypodiaceae

1. *Pteridium aquilinum* L.—Po man's soap, Alabama. (E. G. Holt.)

Equisetaceae

2. *Equisetum* spp.—Fishpoles, Traverse City, Mich.

Pinaceae

3. *Pinus strobus* L.—The name cork pine, applied to mature trees of this species, appears not to be recorded in current manuals and glossaries.

* No. 1 of this series was published in Torreya, **13**: 225–236, 1913, and No. 2 in Torreya, **16**: 235–242, 1916.

[No. 1, Vol. 20 of Torreya, comprising pp. 1–16, was issued 1 April 1920]

4. *Tsuga canadensis* L.—Weymouth fir, Juniata River, Pa. (Schoepf, I, p. 226.)

Zannichelliaceae

5. *Potamogeton americanus* Chamisso and Schlechtendahl.—Flag, cane grass, Reelfoot Lake, Tenn.

6. *Potamogeton pectinatus* L.—Potato moss, duck moss, duck grass, Salt Lake Valley, Utah. (A. Wetmore.)

7. *Ruppia maritima* L.—Redhead grass, Horn Point, Va.

8. *Naias flexilis* Willdenow.—Cedar grass, Horn Point, Va.

Scheuchzeriaceae

9. *Triglochin maritima* L.—Goose grass, Lower Klamath Lake, Calif.

Vallisneriaceae

10. *Vallisneria spiralis* L.—Celery grass, Horn Point, Va.; Canvas-back grass, Chesapeake Bay, Md. (Sharpless in Audubon, Ornithological Biography, 5, 1839, p. 137.)

Gramineae

11. *Echinochloa crus-galli* L.—Whiteshank, red-shank, Brunswick Co., S. C.; cat-tail, Charleston, S. C., Savannah, Ga.

12. *Zizaniopsis miliacea* Michaux.—Sword grass, Goose Creek, S. C.

13. *Zizania aquatica* L.—Water tare-grass (Pennant, II, p. 263); reed is the name that has long been, and still is in use in the vicinity of Philadelphia, Pa., and Wilmington, Del.

14. *Calamagrostis inexpansa* A. Gray.—Wild redtop, Lower Klamath Lake, Calif.

15. *Spartina michauxiana* Hitchcock.—Prairie grass, ramrod grass, Peruque, Mo.; lowland grass, sawgrass, rip-gut, Hartmann, Mo.

15a. *Scolochloa festucacea* Willdenow.—Wild Rice, North Dakota. (F. P. Metcalf.)

Cyperaceae

16. *Eleocharis palustris* L.—Wire grass, Salt Lake Valley, Utah. (A. Wetmore.)

17. *Scirpus occidentalis* S. Watson.—Tule, Salt Lake Valley, Utah. (A. Wetmore.)

18. *Scirpus paludosus* A. Nelson.—Tule, bayonet grass, Salt Lake Valley, Utah (A. Wetmore); latter name used in North Dakota also. (F. P. Metcalf.)

19. *Rhynochspora corniculata* Lamarck.—Spade grass, Savannah, Ga.

PONTEDERIACEAE

20. *Heteranthera dubia* Jacquin.—Buffalo grass, Reelfoot Lake, Tenn. This is the plant to which the name buffalo grass is most frequently applied; however the term is loosely used to denote any submerged vegetation other than cedar moss (*Ceratophyllum*) to which buffalo fish resort; in this way sometimes applied to *Naias flexilis* and *Philotria canadensis.*

JUNCACEAE

21. *Juncus effusus* L.—Sugar grass, Lower Klamath Lake, Calif.

MELANTHACEAE

22. *Veratrum viride* Aiton.—Rattle-snake root. (Schoepf, I, p. 319.)

LILIACEAE

23. *Brodiaea* sp.—Wild onion, ground-nut, Los Angeles, Calif.

24. *Yucca gloriosa* L.—Palmetto, Florida. (Schoepf, II, p. 243.)

TRILLIACEAE

25. *Trillium* spp.—Corn lilies, Traverse City, Mich.

SMILACACEAE

26. *Smilax herbacea* L.—Field yam-root, Manitowoc, Wis., R. M. Strong; Bohea tea, Mercersburg, Pa., Detwiller.

27. *Smilax bona-nox* L.—Stretch-berry, Charleston, S. C., J. W. Harshberger.

27*a*. *Smilax* spp.—Bull-grip, Goose Creek, S. C.

IRIDACEAE

28. *Iris verna* L.—Violet, South Carolina. (Schoepf, II, p. 138.)

ORCHIDACEAE

29. *Cypripedium* spp.—Pitcher plant, Traverse City, Mich.

Myricaceae

30. *Myrica* sp.—Low mucker, undoubtedly a corruption of low myrtle, Goose Creek, S. C.

SALICACEAE

31. *Salix amygdaloides* Anderson.—Black willow, Salt Lake Valley, Utah (A. Wetmore.)

32. *Salix exigua* Nuttall.—Gray willow, Salt Lake Valley, Utah. (A. Wetmore.)

BETULACEAE

33. *Carpinus caroliniana* Walter.—Black beech, Admiral, Md. (Francis Harper.)

FAGACEAE

34. *Quercus ilicifolia* Wangenheim.—Bush oak (Schoepf, I, p. 159.)

ULMACEAE

35. *Celtis douglasii* Planchon.—Wild orange, Lyle, Wash. (G. G. Cantwell.)

URTICACEAE

36. *Pilea pumila* L.—Bastard nettle, dead nettle, silverweed. (Stokes, James. Med. and Surg. Rep. 17, 1867, p. 373.)

ARISTOLOCHIACEAE

37. *Asarum* sp.—Coltsfoot. (Schoepf, I, p. 319.)

CHENOPODIACEAE

38. *Allenrolfea utahensis* Tidestrom.—Saltweed, Salt Lake Valley, Utah. (A. Wetmore.)

39. *Salicornia europea* L.—Saltweed, Salt Lake Valley, Utah. (A. Wetmore.)

40. *Salicornia* sp.—Sea cress, Wallops Id., Va.

CERATOPHYLLACEAE

41. *Ceratophyllum demersum* L.—Fish-blankets, Oakley, S. C. (Nathaniel Heyward.); cedar moss, Reelfoot Lake, Tenn.

Cabombaceae

42. *Brasenia schreberi* Gmelin.—Egg bonnet, purple bonnet, Reelfoot Lake, Tenn.

Nelumbonaceae

43. *Nelumbo lutea* Willdenow.—Jacquinot, Peruque, Mo., Alligator buttons, Goose Creek, S. C.; bonnet, yonkapin bonnet, Reelfoot Lake, Tenn.

Nymphaeaceae

44. *Nymphaea advena* Solander.—Mulefoot, mulefoot lily, mulefoot bonnet, Reelfoot Lake, Tenn.

45. *Castalia odorata* Dryander.—Alligator bonnet, Cameron Parish, La. (E. G. Holt.)

Magnoliaceae

46. *Magnolia virginiana* L.—Brewster, Brown's Mills, N. J. (Alex. McElwee.)

47. *Magnolia acuminata* L.—Blue or mountain magnolia. (Schoepf, I, p. 227.)

48. *Magnolia grandiflora* L.—Laurel-tree. (Pennant, II, p. 411.)

Berberidaceae

49. *Achlys triphylla* De Candolle.—Vanilla plant, Carson, Wash. (G.G. Cantwell.)

50. *Podophyllum peltatum* L.—Mug-apple. (Pennant, II, p. 326.)

Menispermaceae

51. *Cocculus carolinus* L.—Sarsaparilla, used as a tonic, Texas. (Lincecum.)

Cruciferae

52. *Bursa bursa-pastoris* L.—Hen pepper, pepper-weed, Marion, Ind.

Capparidaceae

53. *Cleome serrulata* Pursh.—Skunk-weed, several western states. (A. Wetmore.)

Rosaceae

54. *Cercocarpus* spp.—Rabbit brush, quail brush, Apache plume, southern Arizona. (A. Wetmore.)

Amygdalaceae

55. *Prunus americana* Marshall.—Indian plum, Pennsylvania. (Schoepf. I, p. 165.)

56. *Prunus pumila* L.—Butter plum, La Pointe, Wis. (I. A. Lapham.)

Fabaceae

57. *Arachis hypogoea* L.—Been-nuts, Bladensburg, Md. (Schoepf, I, p. 354.)

58. *Aeschynomene virginica* L.—Indigo, Savannah, Ga.

59. *Daubentonia longifolia* Cavanilles.—Seenie bean, Indigo, Cameron Parish, La. (E. G. Holt.)

Simaroubaceae

60. *Holacantha emoryi* A. Gray.—Crucifixion thorn, Higley, Ariz. (E. G. Holt.)

Meliaceae

61. *Melia azederach* L.—Paternoster tree, Virginia. (Schoepf, II, p. 77.)

Anacardiaceae

62. *Rhus copallina* L.—Black sumach, Texas. (Lincecum.)

63. *Toxicodendron radicans* L.—Poison ash, Mercersburg, Pa. (Detwiller.); shoestring weed, Church's Id., N. C.

Ilacaceae

64. *Ilex cassine* L.—Japan, North Carolina, (Schoepf, II, p. 113.) This seems simply a corruption of youpon, but probably was in local use as the author quoted repeats the word in the name of a drink, "Japan tea."

65. *Ilex vomitoria* Aiton.—Deerberry, Texas. (Lincecum.)

66. *Ilex glabra* L.—Bear-bush, Brown's Mills, N. J. (Alex. McElwee.)

67. *Ilex verticillata* L.—Winterberry, Mercersburg, Pa. (Detwiller.); northern holly, Traverse City, Mich.

Celastraceae

68. *Celastrus scandens* L.—Redroot, Mercersburg, Pa. (Detwiller.)

Aceraceae

69. *Acer negundo* L.—White ash. (Schoepf, I, p. 319.)

Sapindaceae

70. *Sapindus drummondii* Hooker and Arnott.—Wild China, groves of the trees called "China motts," Midland, Texas. (E. G. Holt.)

Vitaceae

71. *Vitis labrusca* L.—Raccoon grape, Coatsville, Pa. (Tatnall.); coon-grape, Ashland, Del. (A. Commons.); swamp grape, Tennessee. (T. V. Munson.)

72. *Vitis berlandieri* Planchon.—Fall or winter grape. (T. V. M.)

73. *Vitis cinerea* Engelmann.—Bunch grape, Gumboro, Del. (A. Commons.); sweet winter grape. (T. V. M.)

74. *Vitis cordifolia* Michaux.—Sour winter grape. (T. V. M.)

75. *Vitis coriacea* Shuttleworth.—Leatherleaf, Caloosa or Florida grape. (T. V. M.)

76. *Vitis aestivalis* var. *lincecumi* Munson.—Postoak or turkey grape. T. V. M.)

77. *Vitis munsoniana* Simpson.—Everbearing, bird or mustang grape. (T. V. M.)

78. *Vitis palmata* Vahl.—Cat grape. (T. V. M.)

79. *Vitis rupestris* Scheele.—Sand-beach grape. (T. V. M.)

80. *Vitis simpsoni* Munson.—Rusty winter grape. (T. V. M.)

A number of the grape names here given were obtained from a herbarium set made up by T. V. Munson. They may be in part, mere personal inventions, but on the other hand, some of them appear to be local names collected by this grape specialist. Many of Munson's grape names are included in Bailey's "cyclopedia of Horticulture," but those here recorded have not yet found recognition in modern manuals.

81. *Ampelopsis cordata* Michaux.—Raccoon, or swamp grape, Louisiana. (Clarendon Peck.)

Malvaceae

82. *Sida* sp.—Tea-weed, Goose Creek, S. C.; Savannah, Ga.

Thymeleaceae

83. *Dirca palustris* L.—Wickerby bush, Moosehead Lake, Me. (C. H. Goodwin.)

Onagraceae

84. *Jussiaea diffusa* Forskal.—Water pusley, Reelfoot Lake, Tenn.

Ammiaceae

85. *Erigenia bulbosa* Michaux.—Turkeyfoot, Marion, Ind.

Cornaceae

86. *Cornus stolonifera* Michaux.—Red willow, Traverse City, Mich.

Ericaceae

87. *Arctostaphylos uva-ursi* L.—Mealyberry, Nantucket, Mass. (J. W. Harshberger.)

This name is also used in Pine-barren region of New Jersey.

Apocynaceae

88. *Carissa carandas* L.—Crown-of-thorns, cultivated, Bradentown, Fla.

Asclepiadaceae

89. *Asclepias tuberosa* L.—Indian-plume, Indian-paint, Traverse City, Mich.

Verbenaceae

90. *Callicarpa americana* L.—Sourberry, Virginia. (Schoepf, II, p. 82.); Spanish mulberry, Texas. (Lincecum.)

Labiatae

91. *Clinopodium nepeta* L.—Sheepmint, Cleveland Park, D. C. (H. L. Viereck.)

92. *Cunila origanoides* L.—Pennyroyal. (Schoepf, I, p. 319.)

Scrophulariaceae

93. *Verbascum thapsus* L.—Goose-grass. (Schoepf, I, p. 196.)

94. *Paulownia tomentosa* Thunberg.—Blue catalpa, Washington, D. C.

Rubiaceae

95. *Cephalanthus occidentalis* L.—Buckbrush, Reelfoot Lake, Tenn.; Peruque, Mo.

96. *Mitchella repens* L.—Squawberry, Traverse Ciy, Mich.

97. *Diodia virginiana* L.—Jacob's-ladder, Savannah, Ga.

Caprifoliaceae

98. *Lonicera dioica* L.—Bittersweet, Milwaukee, Wis. (I. A. Lapham.)

99. *Symphoricarpos occidentalis* Hooker.—Buckbrush, badger-brush, Pingree, Binford, N. Dak. (D. C. Mabbott.)

Campanulaceae

100. *Campanula rotundifolia* L.—Blue or heatherbells, Traverse City, Mich.

Compositae

101. *Baccharis halimifolia* L.—Waterbush, water-gall, Horn Point, Va.

102. *Anaphalis margaritacea* L.—Indian tobacco, Traverse City, Mich.

103. *Rudbeckia hirta* L.—Black-eyed daisy, Baltimore, Md.

104. *Rudbeckia montana* A. Gray.—Niggerhead, Uintah Mts., Utah. (J. Silver.)

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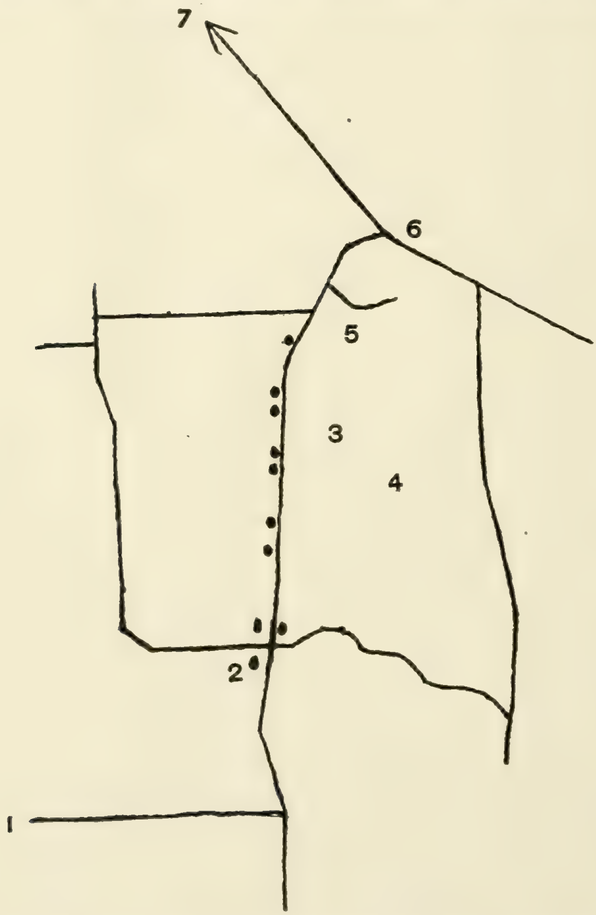
THE HAUNTS OF RHODODENDRON MAXIMUM

By Stewart H. Burnham

Saturday, November 19, 1904, was a very fine mild Indian Summer's day; smoky and hazy but too warm for comfort when climbing hills. The examination of the great laurel brought from Michigan Hollow swamp, a week ago, excited my curiosity and desire to find this shrub growing wild. *Rhododendron*



Sketch showing the station or *Rhododendron maximum* in Michigan Hollow swamp. 1, West Danby; 2, School house; 3, Station for the great laurel; 4, Source of Michigan creek, flowing in a southerly direction: 5, a small pond, source of Tenmile creek, flowing in a northerly direction; 6, Danby; 7, To Ithaca, N. Y.

maximum L. is a rare plant in New York state: something like* "a dozen reported stations . . . scattered from the Adirondacks to Chautauqua Co."; but it occurs quite abundantly on the Pocono plateau in Pennsylvania. However, according to Dr. C. H. Peck,† this showy shrub grows in great profusion about Barryville and in other places in Sullivan county.

The morning train on the Lehigh Valley railroad, from Ithaca was taken to West Danby, ten miles south of the city. It was with some hesitation that I started out in search of this rare shrub, being told that I would not find it, as other collectors had often failed.

Soon after leaving West Danby station, 872 feet above sea level, the ascending road follows the meanderings of a rocky rivulet. For some distance the woods are preserved on both sides of the road; although further east quite a territory had been cut over. It is a very pretty spot, the ground being covered with mosses and ferns, specially of the genera *Hypnum* and *Dryopteris*. *Hylocomium proliferum* (L.) Lindb. was abundant; and *Pogonatum brevicaule* (Brid.) P. Bv., on moist roadside banks. Up the hill, thickets were largely made up of sassafras, witch-hazel and hawthorn. A few unfruited plants of *Lycopodium clavatum* L., *L. complanatum flabelliforme* Fernald and *L. obscurum* L. were found; and as far as observation was made, neither of the first two clubmosses are as abundant in the Cayuga flora as in the Adirondack forests.

To where one enters the swampy woods it is about two miles from West Danby and one from Danby. The rail fence to be followed lies between two houses south and two houses north; with moderately large slate-colored barns standing on the east side of the road. The fence should be followed down to the "jog" in the woods; then one should go north a few paces, then directly east, a five minutes walk to the moister shades of the wood.

Michigan Hollow swamp covers several hundred acres, but in less than a quarter of an hour after entering the woods, the great laurel was found. The muddy bottom of partly desiccated

* W. R. Dudley, The Cayuga Flora, 59. 1886.

† N. Y. State Mus. Rep. 47: 31. 1894 Bot. ed.

pools were covered with mats of golden saxifrage, *Chrysosplenium americanum* Schwein., swamp saxifrage, *Micranthes pennsylvanica* (L.) Haw, and the naked bishop's-cap, *Mitella nuda* L. There are quite large white pines and black ash, with much fallen timber and some underbrush in the immediate vicinity. On account of the coriaceous leaves, the great laurel, was easily seen in the leafless woods, but it might be readily passed by in midsummer.

The space covered by *Rhododendron maximum* L. near West Danby is within a circumference of six hundred feet, which is considerably larger than the area ascribed to it in the Cayuga Flora, *i. e.*" 30 meters by 10." There were about seven distinct patches within the area: but one or two were slowly dying. In the wild state, as in Michigan Hollow, the shrubs have a tendency to form circular growths: and this is brought about by the reclining flexuous branches, taking root on becoming buried in the leaf mold and mud—nature performing the work of reproducing the plant by layering. The shrub attains no great height, on account of this natural process, although some of the central stems were at least fifteen feet high and an inch or two in diameter.

The bark on the older stems is rather close-flaky and grayish brown, higher up there is a tendency to exfoliate in light gray, thin plates; and in the leafy portion the young bark is reddish intermixed with gray patches. The wood is whitish and moderately hard. The evergreen leaves, clustered near and at the ends of the branches, are very thick, lance-oblong, about nine inches long including the reddish petiole, one to three inches wide, acute, narrowed at the base, bright green above, paler and smooth or sometimes rusty beneath, and the margin somewhat revolute. At this season, the crowded leaves assume a drooping position. Next season's flower buds were conspicuous, ovate in outline with foliaceous scales, and terminated the branches. Old seed capsules persisted on some of the branches.

The great laurel is slowly spreading and is in no danger of being exterminated, unless the wood choppers reach this portion of the swamp. Further south, in the swamp, some denudation

has taken place. A few fungi were collected, and specimens of *Dryopteris Boottii* (Tuck.) Underw. and *D. intermedia* (Muhl.) A. Gray. One cannot but note the absence of the canoe and gray birches from the Cayuga flora, but the black and yellow birches are met with frequently. There are some fine yellow birches in this section. White, pitch and red pines occur; two fine trees of *Pinus resinosa* Ait., near the schoolhouse south of Danby, at the highest elevation of the road, 1,550 feet above sea level. Boughs of the red pine with cones attached were brought to the city for decorative purposes, and during the evening the cones gradually opened with a noticeable sound.

I climbed the high hill, southeast of West Danby station, 1,577 feet above the sea, in the late afternoon. The sides of the hill had suffered from a forest fire, probably during 1903, and but little timber was left. In the soil were many small flat stones, and near the pine clad summit were thickets of New Jersey tea, *Ceanothus americanus* L. and dockmackie, *Viburnum acerifolium* L. The haze so filled the valley that but little of the landscape could be seen, but the rolling hills, enshrouded as they were, added to the picturesqueness of the scene. On descending, the fruit of deerberry, *Polycodium stamineum* (L.) Greene, fallen to the ground, was found, in general appearance, reminding one of large green service-berries.

The following Monday, I consulted with Mr. Robert Shore, head gardener at the University, about starting the great laurel. He said the best method is by layering, when attached to the shrub, or by rooting the young growth to which a heel (node of older growth) is attached. The latter method was the only one opened to me, and after cutting away three fourths of the leaf, the cuttings were put in the greenhouse. However, I was unsuccessful, as all the cuttings finally died.

Hudson Falls,
New York

SHORTER NOTES

Tilia Europaea in Oregon.—Dr. Gleason's interesting note on *Rhamnus dahurica* in Michigan calls forcibly to mind a similar

experience of the writer in finding an exotic tree naturalized in a spot where it could by no ordinary possibility have been expected. On June 19, 1919, while collecting in the Calapooia Mountains along Smith River, near the northern boundary of Douglas County, Oregon, in a very remote and thinly-settled district about twenty miles to the west of the Southern Pacific Railroad, a tree was observed in a dense thicket of alders and Douglas firs near the roadside that attracted instant attention. No dwelling or other evidence of civilization was anywhere in sight, and the "forest primeval" had apparently never been disturbed. The tree stood about 40 feet in height, and was some six inches in diameter above the base. At the time it was in full flower, and was plainly a linden—a group not represented in the indigenous flora of Oregon, although occasionally found among the shade-trees in the larger towns. Closer examination of the flowers showed that it was typical *Tilia europaea* L.—a tree as little to be expected in the mountain-forest as a fan-palm. The mystery was complete; but it was somewhat dispelled when, on arriving at the little post-office of Gunter, a few hundred yards further on, the stalwart mountaineer who acted as postmaster informed us that some thirty years before an Englishman had taken up a homestead near the spot and engaged in bee-culture—a venture that ended in speedy failure; and the linden was probably a relic of his undertaking, this tree being a favorite with English apiarists. The forest had speedily resumed its sway, and no trace even of a clearing remained; but the linden had grown to a vigorous maturity, and will doubtless live to puzzle the next collector who may penetrate to this remote and little-known district.

James C. Nelson.

BOOK REVIEWS

East's and Jones's Inbreeding and Outbreeding*

"A man should be very careful in the selection of his parents," once said the poet Heine, half bitterly, half jestingly. But

* East, E. M. and Jones, D. E. Inbreeding and Outbreeding; Their genetic and sociological significance. Pp. 285. Illustrated. J. B. Lippincott Co. Philadelphia. 1919. Price, $2.50.

even though one's heredity has been well looked after by preceding generations, one's environment also needs careful consideration if one desires to make the most of life. So the farseeing human being must consider the laws underlying inheritance as applied to his food crops, his meat animals, his pleasure plants and his pleasure animals, for after all, these make up much of his environment.

And it is certain phases of these problems of heredity in plants and animals, including man, which Professors East and Jones have set forth in very interesting, simple, clear and trustworthy fashion in their "Inbreeding and Outbreeding." "Historically," say the authors, "these are old, old problems, practical problems of considerable significance bound up with man's gravest affairs, his marriage customs and his means of subsistence." The value of inbreeding and outbreeding in the establishment and creation of new breeds of domestic animals is still a much discussed question among breeders of live stock. How to produce the largest yields of certain staple grains, such as corn, from an acre of land, is one of the pressing problems of the present and of the near future, since it has a direct bearing on questions involving labor, food supply and increase in population. That more fruit is obtained per unit area from tomato plants grown from certain kinds of outcrossed seed is probably unknown to most truckers, seedsmen, canning-factory managers and home gardeners. Over laws regulating the marriage of first cousins and other near relatives, our lawmakers still dispute. And of the effects, good and bad, of immigration, the "melting pot" and the intermingling of races through marriage, even the intelligent public is still largely uninformed from a biological standpoint. Much light is thrown on these fascinating and important questions as well as upon many others, such as heredity and disease, reproduction in animals and plants, the increased vigor of hybrids in many animals and plants over that of their parents, the mechanism of heredity, sterility, and the inheritance of genius in man. While this book is designed especially for those interested in general biology, the authors had also in mind the farmer and the live stock breeder, and *especially* the physician,

the clergyman, the social worker, the penologist and the statesman for "all we would ask is that 'these' give conscientious consideration to the facts of heredity as a guiding principle in the solution of the problems of the family with which they have to do. No questions are so hedged about with superstition, with irrational tradition, with religious dogma, as those which concern sex and reproduction; no problems are more delicate, more difficult, than those which seek the direction of human evolution; yet after all, man is an animal and must be dealt with as such. Civic law he may escape, to natural law there is no immunity."

ORLAND E. WHITE.

Recknagel's and Bentley's Forest Management*

There is at present an active movement, led by professional foresters with Lt. Col. Graves, Chief of the U. S. Forest Service, at their head, for the application of forestry to privately owned timberlands in the United States. These lands contain three quarters of the standing timber in the United States, and are for the most part being cut without regard to the future. Whether or not Recknagel's and Bentley's "Forest Management" was planned by the authors as a part of this movement, aside from the avowed purpose of stimulating forestry practice in general, we do not know. In any case the book fits in admirably and is most timely.

The authors do not claim originality for their work, admitting that most of their material is already contained in the technical literature already published in this country. Nor do they aim at popular treatment. Their purpose is to present the subject in such a way that it can be understood and applied by the owners of forest lands who are not professional foresters. This does not apply to the farmer and owner of a small woodlot for whom Ferguson has already written "Farm Forestry."† In France the bulk of the forests are held by private owners as in this country, but forestry is universally practiced. Most of the

* Recknagel, A.B., and Bentley, J., Jr., Forest Management, xiii + 269 pages, 26 figures, John Wiley and Sons, New York, 1919, net $2.50.

† Ferguson, J. A., Farm Forestry, viii + 241 pages, illustrated, John Wiley and Sons, New York.

owners cannot afford the services of a highly trained forester. They themselves understand enough forestry to be able to manage their lands intelligently with the help of one or more forest guards or rangers. It appears to be the purpose of Recknagel and Bentley to assist in building up this type of owner in the United States. If this can be done the gain to the country will be incalculable.

The book gives briefly but clearly the essentials of the four branches of Forest Management, namely: (1) forest mensuration or the measurement of the tree crop including growth, (2) forest organization or regulation of the cut so as to secure regular periodic returns from the forest, (3) forest finance, a complex but important phase of the subject, and (4) forest administration or the organization and personnel of the force necessary to protect and control the forest.

It would be useless to pretend that such a subject as forest management can be readily understood and applied by the layman. It will require time and study, and often at the outset the assistance of expert advice. But this book will be of great assistance, and make possible to the forest owner an understanding of how to go about the matter, and of what returns he may expect on his outlay.

The book has still another field of usefulness. It is sufficiently detailed and accurate to be of much value to the professional forester as a convenient handbook of reference in which he may easily find certain formulae and tables which he could not possibly keep in his head. On the whole therefore the book is a valuable and welcome addition to forestry literature.

Barrington Moore

PROCEEDINGS OF THE CLUB

November 11, 1919

The meeting was held at the American Museum of Natural History at 8.15 P.M., President Richards presiding. There were fifty persons present.

The usual business was dispensed with and Professor A. H. Cockayne, of the Agricultural Department of New Zealand, gave an illustrated lecture on "Botanical Features of the Flora of New Zealand." A general discussion followed the lecture, after which the meeting was adjourned.

B. O. Dodge,
Secretary

NEWS ITEMS

Dr. B. O. Dodge for the last nine years the Club's Secretary and Treasurer, has resigned his position from the department of botany at Columbia University and gone to the Bureau of Plant Industry at Washington. Dr. Francis W. Pennell of the New York Botanical Garden has been elected Secretary-Treasurer of the Club.

Dr. Carl Skottsberg the director of the new botanical garden at Göteborg, Sweden, who lectured before the Club in the autumn of 1918, *en route* from Chili to Göteborg, writes that, like our own, the winter just past was of exceptional severity. The garden is to have special geographical sections of which that devoted to Eastern Asia will be planted in 1920 and the North American section in 1921.

Dr. Roland M. Harper has recently completed some studies on the resources of southern Alabama, including considerable work on the vegetation. He has gone to central Florida, where he will carry on similar work, which was started in 1915. His address will be Geological Department, Tallahassee, Florida.

TORREYA

Vol. 20 No. 3

May–June, 1920

ADDITIONS TO THE FLORA OF WESTERN OREGON DURING 1919

By James C. Nelson

It has been possible to continue the examination of our flora during the past season along the lines suggested in my previous notes (Torreya **18**: 21–35; ib. 220–226. 1918). It was pointed out at that time (1) that the boundaries established in Piper & Beattie's Flora of the Northwest Coast were very easily crossed by indigenous species of adjacent range; (2) that our climate and soil are so favorable to the introduction and spread of foreign species that a steady increase in our plant-population may be expected from this source. The following notes on the collections of the past season may serve to verify both of these propositions. In the matter of native species, I was able to study three regions which may be regarded as natural avenues of ingress. One of these was the Calapooia Range along the southern boundary of Lane County, which was selected by Piper and Beattie as marking the southern limit of their Flora. I had ventured the assertion (Torreya 18 : 23) that this seemed a very slight barrier to interpose to the northward extension of the Californian flora. But I had not at that time visited the region, and knew nothing of its topography in detail. In June of the present year (1919), I made my headquarters at Cottage Grove, within two hours' walk of the Calapooias, and worked along the range for a total distance of some thirty miles east and west. I found it of very moderate elevation, the highest summit visited reaching only 2,200 feet, and pierced by two main arteries of travel, the Southern Pacific Railway and the Pacific Highway, not to mention many minor roads and innumerable trails. Just where the

[No. 2, Vol. 20, of Torreya, comprising pp. 17–36, was issued 4 June, 1920.]

authors of the Flora meant to draw their boundary-line I was unable to determine; perhaps, like myself, they were misled by the map, on which the Calapooia Range appears as a single well-defined ridge. As a matter of fact, it is a complex of mountains and valleys at least ten miles in breadth, flanked by foothills on both sides, but with a somewhat more abrupt approach on the north than on the south. To draw a botanical boundary-line under such circumstances would be most difficult, for any plant that succeeded in finding its way into the range would have little trouble in advancing into the more open country to the north. There are no summits above snow-line to be crossed, no streams of any considerable width, no barren areas, no zones of continuous cultivation, no appreciable change of climate—in fact, the casual collector would never dream, from any outward indications, that he was approaching anything as momentous as a botanical boundary. It is not surprising therefore that several species were collected during this trip which find no mention in the pages of the Flora of the Northwest Coast.

After this hasty survey of the southern boundary, it seemed in order to visit the eastern one, and try to determine to what extent the Cascades have barred the way to the flora of Eastern Oregon. Here is a real mountain barrier, often rising far above snowline, pierced by few avenues of travel, and with very diverse climatic conditions on the two faces. The point of attack was Mount Jefferson, on the eastern line of Linn County—a precipitous volcanic peak, 10,500 feet in height, and so steep that only a veteran Alpinist can hope to reach the summit. Much of the west slope is too sheer for trees to get more than a precarious foothold, and a large part of the region has in addition been swept by forest-fires, so that an aridity prevails in many places which would not ordinarily be expected on the western side of the Cascades. It was not surprising, in an environment so similar to the semi-arid region of central Oregon, to encounter species which have been thought to belong only to the eastern division of the state.

Our *western* boundary, consisting of the Pacific Ocean, could not be expected to afford an avenue for any introductions except

such as were frankly indebted to human agency for their transportation; but the *northern* boundary of the State, although not the northern boundary of the Flora of the Northwest Coast, seemed worth some study. Along the sand-bars of the Columbia and on its low muddy shores is a surprising aggregation of species that have either been brought down by the river from their inland range, or have found lodgment in some unexplained way after wider wanderings. The number of these unexpected strangers will be evident after a study of the following list.

In addition to these penetrations of the frontier by indigenous species, the influx of foreign forms has been found to continue unabated. Just where they come from it is usually quite impossible to determine; they were not here yesterday, but to-day we find them, and to-morrow, so favorable are our soil and climate, we can be reasonably certain that they will still be here. Not only is this true in the centers of population, but very often our first encounter with these new plants is in some remote country district or along some mountain stream. No species has been included in the following list that was not growing spontaneously and with a good chance of perpetuating itself indefinitely. Every one of these species was collected within the Oregon limits of the Flora of the Northwest Coast, and is understood to be without mention in that work. Specimens of each have been deposited in the Gray Herbarium, and I must again express my indebtedness to Mr. J. Francis Macbride for his unwearying kindness in revising and correcting my attempts at determination, as well as in clearing up many knotty problems of nomenclature and specific limits. Species that are clearly introduced are marked with an asterisk(*). A number of these were originally reported in my list of Linnton ballast-plants (Torreya **17**: 151–160). At the time they did not seem sufficiently stable to be worthy of inclusion in a list of established species; but, although the area was occupied by a shipyard during the war, and the vegetation upon it consequently subjected to a very rigorous test (most of the ground being excavated or planked over, covered with piles of material and machinery, and tramped over daily by hundreds of men and horses), I was delighted to find that several species

had survived all these vicissitudes, and were still flourishing on the occasion of my last visit in August, 1919. I feel therefore that they have earned their right to be regarded as permanent members of our flora, and they are included in the following list.

1. *Azolla caroliniana* Willd. In shallow water at the west end of Oswego Lake, Clackamas County. Also reported by Gorman from Oak Grove in the same county.
2. *Equisetum fluviatile* L. var. *polystachyum* (C. Brückn.) A. A. Eaton. With the species in a marsh at the east end of Pamelia Lake, at the southwest base of Mt. Jefferson. Apparently has been found but once before in this country, by Flett at Tacoma, Wash.
3. **Digitaria sanguinalis* (L.) Scop. On site of old stable, Salem.
4. **Setaria glauca* (L). Beauv. In waste ground on river-bank, Salem.
5. **Ammophila arenaria* (L.) Link. In shipyard on old ballast, Linnton, Portland.
6. **Aspris capillaris* (Host.) Hitchc. Beginning to appear in many places, but first collected on a sand-bar in the North Santiam River at N. Santiam Station, Marion County.
7. *Eragrostis caroliniana* (Spreng.) Scribn. On a sand-bar in the Columbia on Hayden Island, opposite Vancouver, Wash. Has been reported from southeastern Oregon, and common in the Middle West.
8. **Bromus brizaeformis* F. & M. In shipyard, Linnton. Very common east of the Cascades.
9. **Agropyron junceum* (L.) Beauv. With the last. A species of northern Europe.
10. **Secale cereale* L. A frequent escape in railroad yards, Lower Albina, Portland.
11. *Scirpus pauciflorus* Lightf. In mountain meadow in Hunt's Cove, three miles south of Mt. Jefferson—altitude 6,000 feet.
12. *Carex brachypoda* Holm. With the last.
13. *Carex ormantha* (Fernald) Mackenzie. With the last.
14. *Allium attenuifolium* Kellogg. Not uncommon in dry soil about Salem.

15. *Salix lasiolepis* Benth. var. *Bigelovii* Bebb. In low ground along Mill Creek, Turner. Det. by Camillo Schneider.
16. *Salix lasiandra* Benth. var. *lancifolia* Anderss. Rather frequent along streams and borders of ponds. Det. by C. Schneider.
17. **Polygonum prolificum* (Small) Robinson. Sandy soil in railroad yards, Lower Albina, Portland.
18. **Polygonum polystachyum* Wall. Dry roadside near State Fair Ground, Salem; also about old barn at Wheatland, Yamhill County. A native of the Himalayas and Afghanistan.
19. **Fagopyrum esculentum* Moench. Along railroad tracks, Silverton.
20. **Roubieva multifida* (L.) Moq. In shipyard, Linnton, and abundant in waste ground at Lower Albina.
21. **Atriplex patula* L. var. *hastata* (L.) Gray. Abundant on rubbish heaps and in waste ground at State Fair Ground, Salem.
22. *Spergularia salsuginea* Fenzl var. *bracteata* Robinson. Mud-flats along the Columbia on Hayden Island.
23. **Lychnis alba* Mill. On sand-bars in North Santiam River, and in grain fields at Salem.
24. **Silene pendula* L. In an abandoned garden, Salem.
25. **Dianthus barbatus* L. Shady roadside near Marion, Marion County.
26. *Thalictrum polycarpum* Wats. Not infrequent in low ground in the Willamette Valley.
27. **Nigella damascena* L. In waste ground and vacant lots, Salem.
28. *Delphinium leucophaeum* Greene. On rocky cliffs about Oswego Lake, and along the Willamette River at Elk Rock. Apparently a distinct species.
29. **Glaucium flavum* Crantz. In ship-yard on old ballast, Linnton.
30. **Lepidium virginicum* L. With the last.
31. **Brassica incana* Tenore. With the last.
32. **Diplotaxis tenuifolia* (L.) DC. With the last; also in railroad yards at Lower Albina.

33. **Roripa sylvestris* (L.) Bess. Dry soil along streets, Salem.
34. *Roripa lyrata* (Nutt.) Greene. Muddy shores of Pamelia Lake, Mt. Jefferson.
35. *Cardamine Lyallii* Wats. About a spring on mountain-side, in Hunt's Cove, Mt. Jefferson region.
36. **Arabis alpina* L. Common in cultivation at Salem, and escaping freely to garden-borders and street-parking.
37. **Reseda lutea* L. In shipyard, Linnton.
38. **Reseda Luteola* L. With the last; also in railroad-yards, Lower Albina.
39. *Cotyledon oregonensis* Wats. On dry rocky slope, three miles south of Mt. Jefferson.
40. *Saxifraga arguta* Don. In boggy soil on mountain-side, Hunt's Cove, Mt. Jefferson region.
41. *Saxifraga saximontana* E. Nels. On wet cliffs, Oswego Lake and Elk Rock.
42. *Saxifraga fragosa* Suksd. Low woods along Mill Creek, Turner.
43. *Potentilla Drummondii* Lehm. Mountain-meadow in Hunt's Cove, Mt. Jefferson region.
44. **Potentilla rivalis* Nutt. On rubbish about city dump, Portland. Reported by Gorman from Columbia Beach.
45. **Rubus illecebrosus* Focke. A Japanese species, stubbornly persisting after cultivation in a garden at Salem, and almost impossible to eradicate.
46. **Cytisus multiflorus* (Ait.) Sweet. Common in cultivation about Portland, and well established in a dry pasture three miles east of Tualatin, Washington County.
47. **Melilotus officinalis* (L.) Lam. Common in waste ground about Portland.
48. **Lotus corniculatus* L. In shipyard, Linnton.
49. **Ononis arvensis* L. With the last.
50. **Lathyrus hirsutus* L. On vacant lots and street-parking, Salem; also reported by Sheldon from Portland.
51. **Lathyrus sphaericus* Retz. In dry soil on neglected street-parking, Salem.
52. **Euphorbia Helioscopia* L. On rocky shore of the Willamette, Lower Albina, Portland.

53. **Tilia europaea* L. Thoroughly established at border of woods by roadside, Gunter, Douglas Co., in the Calapooias.
54. *Sidalcea Nelsoniana* Piper. Not uncommon in dry ground about Salem. This is the "apparently undescribed species" of my list in Torreya (18 : 28. No. 90).
55. **Althaea rosea* Cav. A common escape to vacant lots and waste ground, Salem.
56. **Viola odorata* L. Escaping to cultivated ground about Salem. This is the form with white *single* flowers.
57. *Viola orbiculata* Geyer. Dry woods near timber-line on Mt. Jefferson. Previously collected in this region by Gorman.
58. **Oenothera mollissima* L. In shipyard, Linnton. An Argentinian species.
59. *Sphaerostigma andinum* (Nutt.) Walp. On muddy shore of the Columbia on Hayden Island.
60. *Clarkia rhomboidea* Dougl. Dry woodland on Parrott Mountain, three miles northeast of Newberg.
61. *Lomatium microcarpum* (Howell) C. & R. On a rocky ridge in the Calapooias, two miles northeast of Comstock, Douglas County. Perhaps the first report since its discovery at Roseburg.
62. *Arctostaphylos patula* Greene. Dry slope of Mt. Jefferson, above Pamelia Lake.
63. **Asclepias syriaca* L. On vacant lots and street-parking, Salem.
64. *Phacelia californica* Cham. Dry soil along railroad, Cottage Grove. This is Macbride's forma *vinctens* (Contr. Gray Herb. 49: 37. 1917); but as no such present participle seems to occur in the Latin language, and it was evidently Mr. Macbride's intention to use a form of *vincire*, to bind or twine, it would not seem a violation of the International Rules to substitute the form *vinciens*, and the correction is accordingly proposed.
65. *Phacelia Bolanderi* Gray. Rocky slope along the Pacific Highway in the Calapooias, one mile south of Divide, Lane County.

66. *Phacelia nemoralis* Greene var. *mutabilis* (Greene) Macbr. Very common in dry soil—perhaps the only form of this species in the Willamette Valley.
67. *Cryptantha Hendersonii* (Nels.) Piper. Not infrequent in rocky woods, especially near Portland.
68. **Omphalodes linifolia* (L.) Moench. Beginning to escape to street-parking, Salem.
69. *Verbena prostrata* R. Br. Dry soil along the railroad, in the Calapooias, three miles south of Divide.
70. **Solanum rostratum* Dunal. In railroad yards, Lower Albina.
71. **Solanum sisymbriifolium* Lam. In shipyard, Linnton.
72. *Linaria texana* Scheele. On a rocky ridge in the Calapooias, two miles northeast of Comstock, Douglas County.
73. **Plantago major* L. var. *intermedia* (Gilib.) Dcne. Not infrequent on muddy shores about Salem.
74. **Galium Mollugo* L. Frequent on lawns in Salem.
75. **Centranthus ruber* DC. Often persisting in yards, Salem.
76. **Echinocystis lobata* (Michx.) T. & G. In thickets along Mill Creek, Salem.
77. *Erigeron confinis* Howell. On dry rocky slope of Mt. Jefferson. This seems very close to *E. aequifolius* Hall, a species of the Sierra Nevada, and closer study is needed.
78. **Ambrosia psilostachya* DC. In railroad yards, Lower Albina.
79. *Franseria acanthicarpa* (Hook.) Cov. Sand-bar on Hayden Island.
80. **Xanthium oviforme* Wallr. With the last. A native of the Orient, which has probably been confused in the West with *X. speciosum* Kearn.
81. *Rudbeckia occidentalis* Nutt. Dry soil along roadside in the Calapooias, a half-mile south of Divide. Also reported by Gorman from the Three Sisters.
82. **Matricaria inodora* L. In shipyard, Linnton.
83. **Artemisia vulgaris* L. With the last; and also in railroad yards, Lower Albina.
84. **Artemisia annua* L. In railroad yards, Lower Albina.
85. *Artemisia ludoviciana* Nutt. On sand-bars in the North

Santiam River; and also along the shores of the Columbia near Portland.

86. *Cacaliopsis Nardosmia* Gray. In open woods on the summit of a ridge in the Calapooias, seven miles northwest of Drain, Douglas County.
87. **Carduus nutans* L. In shipyard, Linnton.
88. **Cirsium arvense* (L.) Scop. var. *vestitum* Wimm. & Grab. With the last.
89. **Centaurea Calcitrapa* L. With the last.
90. **Hieracium Pilosella* L. Abundant in a lawn at Salem, threatening to become a formidable pest, as it is most difficult to eradicate.

This list brings the total of species added to the flora of Western Oregon since these studies were begun to 309. As the number listed in the Flora of the Northwest Coast is 1617, it will be observed that the authors of that work failed to mention about sixteen per cent. of the total number of species in their territory. In other words, the student who depended wholly on their manual would fail to determine about every seventh species which he encountered—a margin of possible error much too large to be comfortable.

Whether this state of uncertainty will be relieved by the next manual due to appear in this district—Professor Abrams' Illustrated Flora of the Pacific Coast, the first volume of which is understood to go to press about the first of the year—still remains on the lap of the gods. The Oregon botanists realize that a close personal survey of their territory yet remains to be made; and as the value of "absent treatment" as applied to the preparation of a flora is somewhat open to question, it is within the bounds of possibility that these local supplementary lists may still be not wholly valueless after several more of these "comprehensive" manuals have come and gone!

Salem, Oregon

LENGTH OF DAY INSTEAD OF TEMPERATURE CONTROLS TIME OF FLOWERING AND FRUITING*

For generations scientists have known that sunlight was necessary for normal growth of most kinds of plants, and, although the summer sun might occasionally become too hot, they have understood that it could not cause any injury except perhaps the injury due to burning. A recent discovery by W. W. Garner and H. A. Allard, of the Bureau of Plant Industry, United States Department of Agriculture, shows that, entirely apart from any effect of burning, it is possible for plants to have too much daylight or, in other words, too many hours of daylight in comparison with the number of hours of darkness. Too long a day as well as too short a day will prevent many kinds of plants from ever reaching their stage of flowering and fruiting.

Furthermore, the intensity of the light has very much less significance upon the growth of the plant than has usually been supposed. Greenhouse experiments prove that the flowering and fruiting period of practically any plant can be made to take place at any time of the year by darkening the greenhouse in the morning and evening if the day is too long, or by lengthening the day by artificial light if the day is too short. This new theory of controlling flowering and fruiting of plants undoubtedly will be used by florists and other greenhouse operators. For example, violets bloom only during the comparatively short days of spring; but if violet plants are covered with light-proof boxes at night and not uncovered until the sun is about half an hour high each morning during the summer time, violets can be forced to bloom again in the summer. Spring flowers and spring crops happen to be spring flowers and spring crops because the days at the season of their flowering and fruiting have the proper

* From a recent news bulletin of the U. S. Department of Agriculture. The *Journal* of Agricultural Research recently contained an article of which this is a popular account. The work is perhaps the most significant in recent ecological research. An apparent exception to the theory is the fact that the Lapland Rhododendron, brought from the summit of Mt. Marcy to the Brooklyn Botanic Garden, was kept all winter in the dark and flowered at Brooklyn six weeks before the normal period above the timber line. In this case it flowered only about four weeks after the winter covering was removed.—ED.

number of hours of daylight. Correspondingly, the early summer flowers and crops must have a longer period of daylight. This has been proved as to a large number of plants, and the scientists believe that the principle will hold throughout the higher forms of plant life, and that it is probably applicable to animal life as well.

Reproduction Depends on Day Length

The plant can not attain sexual reproduction, it has been shown, except when it is exposed to a favorable length of day. The requirements, however, differ widely with species and varieties. But a length of day that is unfavorable to reproduction may be favorable to growth. Under that condition, the plant continues its vegetative development profusely and indefinitely without bearing fruit. A length of day may be found that is favorable both to sexual reproduction and vegetative growth. That tends to bring about the "ever-bearing" type of fruiting.

By employing dark chambers to shorten the period of light and artificial lights to extend it, scientists of the Department have shortened or lengthened the life cycle of plants, have made some of them complete two cycles in a single season, have brought others into flower and fruit months in advance of their regular time and, with still others, have greatly delayed and even completely prevented fruiting.

Long series of tests have been made with soy beans, tobacco, wild aster, climbing hempweed, beans, ragweed, radish, carrot, lettuce, hibiscus, cabbage, violets, goldenrod, spinach, cosmos, iris, beggartick, buckwheat, and various other plants.

A test made with Biloxi soy beans will show how the principle works. For the test plants the day was shortened by several hours. That is, they were exposed to the light only from 10 o'clock in the morning till 3 o'clock in the afternoon. They were first placed in the dark house on May 20. Control plants, otherwise treated exactly like the test plants, were left exposed to the light from dawn till dark. The first blossoms appeared on the dark-house plants on June 16. No blossoms appeared until September 4 on the plants that were left in the light all day. But the dark-house plants averaged only 6 or 7 inches high, while

the plants that were left in the light all day grew to an average height of 57 or 58 inches.

These plants required a short day and a long night for flowering and seed-bearing. In tests with other plants, just the opposite was found to be true. The plants that were left in the light all day did not grow luxuriantly, but produced flowers and seed, while those that were kept in the dark part of the day made abundant growth, but produced no seed or else were greatly retarded in producing seed.

Temperature Has Little Influence

Temperature appeared to exert no influence in these tests. The results were the same, even when the temperature was higher in the dark house than on the outside. Another striking illustration of the relative unimportance of temperature is the fact that plants kept in the dark for a part of the day underwent, in midsummer, the changes that in nature come in the fall and have always been attributed to lower temperatures. This, also, was true even when the dark houses registered a higher temperature than that of the outside summer atmosphere.

The results obtained by artificially extending the period of light are just as interesting as those obtained by artificially shortening it. The artificial illumination, in a test with iris, was so arranged as to give 18 hours of continuous light in a greenhouse during the winter. Control plants were kept in a similar greenhouse with no artificial light. The test was begun on October 20, 1919. In the greenhouse where daylight was supplemented with electric light the plants made rapid growth, soon attained normal size and produced blossoms on December 24. The plants in the greenhouse where no artificial light was used, though it was kept at the same temperature, remained practically dormant and showed no tendency to blossom as late as February 12, 1920.

Important Influence on Crop Yields

The influence of this discovery on crop yields is likely to be of no little importance. The length of day is proved to be the

most potent factor in determining the relative proportions between the vegetative and fruiting parts of many crop plants. Indeed, fruiting may be completely suppressed by a day either too long or too short. The advance in agricultural practice which may come through this new discovery will have to be brought about largely by plant breeders and other crop specialists. For instance, it will prove of material significance in the future planning of cropping systems for different regions, especially where consideration of new crops from different latitudes is necessary.

This new principle undoubtedly explains the erratic behavior which has been observed with many crops when they are shifted to different latitudes, and may also clear up the conflicting results of variety tests and field tests conducted with the same crops but in different regions. The experiments have shown, for instance, that ragweed requires for flowering a stimulus that is afforded by the shortening of the days and lengthening of the nights. It does not come into flower until the period of daylight falls below 15 hours. In the latitude of Washington, that comes about July 1. But if ragweed seed should be taken to northern Maine and planted, the plants would not experience a length of day below 15 hours until about August 1. Therefore, they could not come into flower until after August 1 and, though the vegetative growth might be very rank, they could not mature seed before killing frosts intervened. The long days, therefore, make it impossible for ragweed to perpetuate itself in that latitude. On the other hand, plants that get their flowering stimulus from a long day could not perpetuate themselves through seed formation at the equator, where the day never exceeds 12 hours.

Explains Luxuriant Growth in Northern Latitudes

This principle affords the clue to the fact that many plants grow most luxuriantly near the northern limit of their range. The long northern day allows them to attain their maximum growth before the shorter day intervenes to check vegetative growth and start the reproductive process.

It may be found eventually, say the men who worked out the principle, that the animal organism, also, is capable of responding to the stimulus of certain day lengths. They believe that the migration of birds may be an illustration. Direct response to such a stimulus, they say, is more in line with modern teachings of biology than theories which assume that birds migrate as a matter of instinct.

PIN OAK IN NEBRASKA

By Raymond J. Pool

In a handbook of Nebraska trees published in March, 1919, I made the statement that: "Pin oak does not occur naturally in Nebraska, but it occurs in north central Missouri and eastern Kansas, so we may expect it to wander into our state some day via the southeastern corner." The statement is rather interesting in view of the fact that pin oak was discovered in southeastern Nebraska during the summer of 1919.

Early in September, 1919, Mr. Thomas D. Howe, collector for the department of botany in the University of Nebraska, collected specimens from an oak tree growing near Table Rock, Nebraska, and he believed that the tree was pin oak, *Quercus palustris* Du Roi. Mr. Howe brought his specimens to the department of botany where his earlier judgment was confirmed by further study and comparison by several members of the department.

The tree in question is about 20 feet in height with a trunk diameter of about 5 inches, breast high. It is growing in association with red oak at the edge of the natural oak woodlands on the north-facing slope of a low hill about 1½ miles northeast of Table Rock. That town is in Pawnee county, about 35 miles from the extreme southeastern corner of the state, but only about 15 miles from the Kansas-Nebraska state line.

The nearest house is a quarter of a mile from where the tree stands on the edge of the forest where the forest gives way to a cultivated field. It would seem very unlikely that anyone could have planted the acorn in such a place; there would be no

object whatever in starting a pin oak in that particular spot. There are no planted pin oaks in the vicinity. All of our evidence clearly indicates that the tree discovered by Mr. Howe is native. As such this tree is doubtless the most westerly individual of the pin oak yet discovered growing under natural conditions, and to all appearance native. This adds another species to the list of native trees of Nebraska, a list which now contains about sixty-five species.

The specimens which Mr. Howe collected are now deposited in the herbarium of the Botanical Survey of Nebraska.

It may be of interest to the readers of this journal, in connection with the above note, to have a list of all of the native oaks of Nebraska. The list follows:

Bur oak, *Quercus macrocarpa* Michx.
Red oak, *Quercus rubra* L.
Black oak, *Quercus velutina* Lam.
Scarlet oak, *Quercus coccinea* Moench.
Black jack oak, *Quercus marilandica* Moench.
White oak, *Quercus alba* L.
Swamp white oak, *Quercus bicolor* Willd.
Yellow oak, *Quercus acuminata* (Michx.) Sarg.
Low yellow oak, *Quercus prinoides* Willd.
Laurel oak, *Quercus imbricaria* Michx.
Pin oak, *Quercus palustris* Du Roi

The bur oak is by far the most abundant and most widely spread species of the genus in this state. The species is found very commonly in the drier sites in the gallery woods along the streams quite generally over the eastern half of the state. The commonest oak associate of the bur oak is the red oak, although the latter is not nearly so widely distributed or as abundant as the bur oak. On the dry exposed bluffs the bur oak is often dwarfed to such a degree as to form a chaparral-like association, often called "scrub oak."

Except for bur oak and red oak our native oaks are very nearly all restricted in their distribution to the area south of the Platte river along the bluffs and ravines of the Missouri river and extending westward along the tributaries of the latter stream for a

scant twenty to forty miles. These represent the western-most extensions of species, all of which are much more abundant farther eastward or southward. White oak, black jack oak, laurel oak and pin oak are very rare within that area. Yellow oak, low yellow oak and swamp white oak are relatively abundant in a very few localities.

The ecological relations controlling these distributional phenomena are quite well known. The major ecological factors indicate a very decided advancement toward an increased xerophytism extending westward and northward from the southeastern corner of the state.

LINCOLN, NEBRASKA,
December, 1919.

SHORTER NOTES

THE PAPER MULBERRY (*Broussonetia*) AN "ARTILLERY PLANT."—A number of the Nettle Family (*Urticaceae*) are known be eject the pollen forcibly, one of these plants (*Pilea serpyllifolia* Wedd., or *P. muscosa* Lindl.) being often cultivated under the name "artillery plant" because of the curious explosive opening of the staminate flowers. Particularly when the plants are placed in sunlight, after having been sprinkled, the pollen is forcibly thrown out in a smoky cloud, reminding one of the bursting of miniature shells or bombs.

I was much interested last spring to find that the Paper Mulberry (*Broussonetia papyrifera* Vent.) has the same habit of throwing its pollen as has the *Pilea*. It is interesting to recall, also, that these plants are in closely related families, the *Moraceae* and *Urticaceae* having much in common. The 21st of May, 1919, in Philadelphia was a warm showery day, the frequent thunderstorms alternating with bright hot sunshine, and the paper mulberries, dripping after a shower, presented a curious spectacle in the bright sunlight. There was a continuous succession of puffs of smoky pollen from various parts of the tree, apparently all the flowers in a catkin exploding at once and filling the air with yellow "smoke" to a radius of about an inch in all directions, after which the pollen drifted lazily away on the gentle breeze.

Presumably here, as in *Pilea* (see Jost, Plant Physiology, English Edit., 1907, p. 425), osmotic pressure tears an anther loose from the base of the stamen, the filament straightening with sufficient force to throw out the pollen. The staminate flowers are in a rather compact catkin and it is likely that the jar of one stamen straightening and bursting is enough to set off the other flowers; at any rate, examination of a catkin after an explosion shows generally that all of the flowers have been sprung and the pollen thrown out.

O. E. JENNINGS

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PITTSBURG, PA.

REVIEWS

Knowlton's Mesozoic and Cenozoic Plants of America*

Those who have had occasion to deal with American Cretaceous or Tertiary plants have long used and valued Dr. Knowlton's Catalogue published in 1898, which brought together the scattered records in the most convenient form. The new Catalogue, a work of 815 pages, enumerates all the Mesozoic and Cenozoic species, including, as Dr. Knowlton informs me, no less than 4,789 accepted forms. The fossil plants of Greenland and Mexico are excluded, but those of Alaska are fully cited. In its form and arrangement the new Catalogue resembles the old, but it differs in having a series of extremely useful appendices. The first of these gives the classification of all the genera in orders, families, etc.; the second an index of genera and families in the classification; the third enumerates the plants of each formation, from the Triassic to the Pleistocene. The amount of labor represented is enormous, but the saving to others is much greater. My annotated copy of the old list, and my imperfect attempts to cover the ground represented by the appendices, look rather pathetic by the side of this vastly more complete and satisfactory work. We can only hope that with this new aid the very small band of American paleobotanists will be

* Knowlton, F. H., A Catalogue of the Mesozoic and Cenozoic Plants of North America, U. S. Geological Survey, Bulletin 696, 1919 (published early in 1920; received at Boulder, Feb. 18).

increased, so that eventually the whole subject will be adequately revised. This, however, will not occur until there are better publishing facilities, including means of presenting adequate illustrations. Thus, for example, under existing conditions it is futile to attempt to revise the Cretaceous plant remains accumulating in the University of Colorado, since no provision exists for the publication of a report. The Rocky Mountain Cretaceous strata are at present furnishing great quantities of oil and coal, and the volume of wealth produced is almost incredible. Yet no provision is made for a complete and systematic survey of the Cretaceous rocks and their fossils, and the prevailing ignorance leads to great waste and no little fraud, for all of which the public eventually has to pay. Scientific men, who should be conducting fundamental researches, are many of them induced to spend their time working for private companies, so that the general situation tends to get worse rather than better. The proper remedy would be to tax the oil and coal industries for the purpose of securing adequate funds for a continuous scientific survey of all the strata concerned and problems involved. Then young men and women of ability might be induced to devote their lives to research, knowing that they would have fair pay, opportunities for getting the work done, and would be rendering important services to their country. We may still believe that there are many who, under such conditions, would resist the temptation of the money bags.

It must not be supposed that Dr. Knowlton's Catalogue is of interest only to students of fossils. It should be in the possession of every botanist who cares anything about the wider aspects of his science. The lists of species by strata and localities will be especially instructive, and will tend to correct the impression produced by the combined list (as if of a single flora) given in Harshberger's great work on the distribution of American plants. It will be noticed that nearly all the genera of woody plants well represented today in North America also abounded during Tertiary times. The climate during at least the greater part of Tertiary time was evidently warmer than now, but aside from this, the genera were more widespread apparently independently

of climatic influences. Thus the tree flora of Florissant during the Miocene was rich in types now lacking in Colorado. Some of these, as *Ficus*, *Sequoia* and *Magnolia*, could not now exist in this region. Others, however, apparently could live well enough, and do so in cultivation. We thus see that the present flora is to be explained partly by present conditions, but largely also by those of the past, which led to the regional extermination of certain types. The ecologist who concerns himself only with the present is thus like a sociologist who should refuse to study history.

The question has often been raised, how far can we trust the determinations of the paleobotanists? Undoubtedly many of the generic references are erroneous; even Lesquereux, who was not only a great paleobotanist, but also a specialist in living mosses, described a fragment of a fossil conifer as a moss. Nevertheless, very much may be learned from the fossils, and there can be little doubt that on the whole things are pretty much what they seem to be. I believe that a closer study of the Tertiary fossils will throw much light on the origin of elements in the modern floras of North and South America, especially when the results of Dr. Berry's recent trip to the Andes are made available. Thus, it is very interesting to find abundant remains of apparently quite genuine Cunoniaceae (*Weinmannia*) and Proteaceae in the Rocky mountain Miocene. Whence came these southern types? I believe via Asia, rather than by way of South America. So also with *Porana*, an old-world type fossil at Florissant, but represented still by a stranded relic south of the Mexican boundary. So also with *Ailanthus*, *Libocedrus*, etc. Take up the genuinely neotropical flora, that which certainly originated in South America, and note the *absence* of innumerable striking types in our fossil floras. A good example is *Cecropia*, which has some 30 or 40 neotropical species to-day, and would be easily recognized.

Another problem is that of the herbaceous plants. A well-known naturalist wrote me the other day, discussing a problem of animal distribution on the supposition that the grass-like plants first became abundant and well developed in the Miocene.

It is certain that they were then much as they are to-day, with a very long history behind them. The very meager catalogue of monocotyledonous plants in Dr. Knowlton's work should convince any one that no dependence can be placed on the apparent absence of these organisms in particular beds. It is the same with the higher herbaceous plants. Only two genera of Compositæ are listed, both from the Florissant Miocene. One of these is thought by Knowlton to be erroneously identified, and although I was responsible for the determination, I now believe he is right. There are no Campanulales at all except at Florissant. Scrophulariaceæ are represented by a lone Florissant species. Who will maintain that these families did not abound during Tertiary time? Their present diversity and abundance prove that it must have been so. Thus the *absence* of herbaceous fossils proves nothing, though we can reason about the absence of trees which shed their leaves in abundance. Undoubtedly, more minute and critical studies will reveal a wealth of herbaceous fossils, at least as represented by flowers, fruits and seeds. I have many such from Florissant, but have set them aside hoping to make accurate generic determinations. Such remains as these strain one's knowledge of botany to the breaking point, but some day they will be deciphered. In a work of such scope, there will always be some errors and omissions, but in this case they seem to be astonishingly few. I found three species omitted, all involving genera not in the list. These are *Firmianites aterrimus* Ckll.,* *Melica primæva* C. T. & Bierne B. Brues,† and *Xantholithes propheticus* Ward.‡ Dr. Knowlton writes me that *Coniospermites* should be *Conospermites*. *Hicoria antiquora* should be *antiquorum* (a genitive plural). *Carpolithes emarginatus* Perkins, from Vermont, is preoccupied by *C. emarginatus* Goepp. (*Cardiocarpum emarginatum* Goepp. & Berg.), and may be called *C. perkinsi* n.n. There are a few errors in the classification; thus *Thrinax* has somehow got into Araceae, and *Hedera* into Vitaceae.

* Amer. Journ. Science, Nov., 1909, p. 447. (Eocene, Green R., Wyo.)

† Bull. Wisc. Nat. Hist. Soc., Oct., 1908 (received April, 1909), p. 171. (Miocene, Florissant, Colo.)

‡ Glimpses of the Cosmos, IV (1915), p. 150. (Laramie, Montana.)

In Journ. Washington Acad. Sciences, VI: 109 (1916) I described what purported to be a lower Cretaceous Flora in Colorado. The only species I definitely identified was *Matonidium althausii*, a well-known Lower Cretaceous fern. Some additional evidence came to light, and in view of the apparent complications it was thought well to refer the material to Dr. Berry, who published a very valuable article in Bull. Torrey Bot. Club, *46*: 285. Berry concludes that the *Matonidium* is a distinct species, which he names *M. americanum*. With this decision I have no quarrel, but I call attention to the subject to illustrate an unfortunate tendency in paleontology to convert suggestions into positive statements in quotations. Berry states that my plants came from "the supposed McElmo," but I said the deposit was "above the McElmo." A fossil which Berry (no doubt correctly) considers to represent the apical part of a *Matonidium* stipe, I said closely resembled *Cycadospadix*. Berry says twice that I "referred" it to *Cycadospadix*. Knowlton, in his list on p. 732, cites from my paper without any query *Equisetum burchardti* and *Sapindopsis variabilis*, but in the main list a query is given with the latter. I said, "stems . . . may well represent the species *Equisetum burchardti*, but the sheaths are unfortunately wanting," and "leaves . . . may well belong to" *Sapindopsis variabilis*, "although the lateral veins appear to form a more acute angle with the midrib than in that species as figured by Berry." Berry thinks both suggested identifications are wrong, so my cautious language was justified. In nearly all paleobotanical work there is necessarily a considerable margin of error, so that when hesitation or doubt appears it should never be converted without investigation into apparent certainty.

T. D. A. Cockerell

Brown's "Forest Products"*

Botany is the foundation of all sciences dealing with plants. Agriculture and forestry are but applied botany. Brown's "Forest Products" will interest botanists and all those who like

* Brown, Nelson C., "Forest Products, Their Manufacture and Use," xix + 471 pages, frontispiece and 120 figures. John Wiley and Sons, New York, 1919. Net $3.75.

to know where the articles they use come from and how they are made. To foresters this book will be essential because effective forest management requires knowledge of the ultimate forest product, and of how that product is worked up and used.

Trees are among the plants most useful to man. Yet how many botanists know the principal uses of trees, aside from lumber? How many realize that the wood of the chestnut (*Castanea dentata*) is used not only for lumber, railroad ties, and "snake" fences such as Lincoln made in his youth, but produces more than two thirds of the tannic acid products made in the United States?

Brown gives clear and readable accounts of the history, process of manufacture and uses of the principal forest products aside from lumber. In the chapter under "Wood Pulp and Paper" he states that the Chinese, and not the Egyptians, as we had supposed, must be credited with the first manufacture of paper. About eighty to eighty-five per cent of all the paper used in this country is now made from wood, whereas before the middle of the nineteenth century paper was made entirely from other vegetable fibers. The increase in the quantity of wood used for paper has been enormous, over three hundred per cent between 1900 and 1919. The supply of the most desirable wood, spruce, is diminishing so rapidly that other woods are being studied as substitutes, and paper mills are being forced to move out of the country. Brown gives in detail the various processes of making paper.

Of special interest, particularly to foresters, is the information on sources of supply with relation to the present and future forest resources of the country. Naval stores (turpentine and rosin) are doomed to virtual disappearance in a short while owing to the ruthless destruction by lumbering and fire of the longleaf pine forests from which these important materials are derived.

Each product is covered in an interesting and thorough manner. These products are: Wood pulp and paper, tanning materials, veneers, slack cooperage (barrels not for liquids), tight cooperage (barrels to hold liquids), naval stores, hardwood distillation (produces charcoal, acetate of lime, wood alcohol and

other materials), softwood distillation, charcoal, boxes, cross ties, poles and piling, posts, mine timbers, fuelwood, shingles, maple syrup and sugar, rubber, dye woods and materials, excelsior, and cork. Numerous well-selected illustrations and an index add to the attractiveness and usefulness of the book.

BARRINGTON MOORE

PROCEEDINGS OF THE CLUB

NOVEMBER 29, 1919

The meeting was held in the Morphological Laboratory of the New York Botanical Garden at 3.30 P.M. Dr. Marshall A. Howe presided. There were eighteen persons present. The minutes of the previous meetings were read and approved. Mrs. Helen S. Harper, 417 Riverside Drive, and Mr. H. E. Thomas, graduate student, Columbia University, were nominated for membership.

Dr. Howe reported for the editorial board regarding the proposition to publish the Torrey-Schweinitz letters as a memoir of the Club, stating that suitable financial arrangements were being made and the publication of this memoir was assured.

The treasurer announced a contribution of $100 from Dr. J. H. Barnhart to the Underwood Fund.

Dr. Levine spoke of business connected with the *Bulletin* and moved to authorize the chairman to appoint a committee to investigate the various activities of the Club with special regard to retrenchment along certain lines with a view to improving the *Bulletin*. The chairman appointed Professor Harper, Dr. Britton, Dr. Dodge, Dr. Levine, Mr. Taylor, and Professors Hazen and Broadhurst members of this committee.

The secretary announced the death of Mrs. R. McM. Colfelt, who has in the past generously contributed to the support of TORREYA.

The scientific program was then in order. Dr. A. B. Stout spoke on "Notes on Forced Bulbs." "Dr. Stout made a report of observations on the behavior of bulbous plants which have been forced. In the winter of 1916–1917 about 100 bulbs of *Narcissus*

Fazetta were grown in pots and brought into bloom in a greenhouse. In the two seasons of growth since then these plants have produced no flowers. They have, however, made a vigorous and healthy vegetative growth showing clearly that they are not 'run down' plants. Examination of the bulbs shows that there is no blasting due to death of terminal growing points. Further studies will be made to determine if forcing induces a more or less permanent vegetative growth or whether a new bulb of this species naturally requires several years of vegetative growth before a flower stalk is produced. Wild plants of this species obtained from Japan and which have been grown at the New York Botanical Garden for two years have failed to produce flowers. Living plants of the various cultures were exhibited."

Dr. W. A. Murrill gave a paper on "Collecting Fungi near Washington," an abstract of which follows:

"The first two weeks in October were spent in the vicinity of Washington, with excursions to Falls Church, Fairfax Court House, Great Falls, and Mount Vernon in Virginia; and to Baltimore, Reisterstown, and Easton in Maryland. Dr. Howard A. Kelly collected with me one afternoon near Falls Church, securing several specimens of fleshy fungi which he took home and had photographed or painted.

"I went with a party of friends over some of the golf links in the suburbs of Washington and found the common field mushroom, the field puffball, the fairy ring mushroom, and a peculiar large form of *Collybia radicata* which grew only under maple trees. All of these were eaten and enjoyed.

"*Clitocybe illudens* was abundant in oak woods, particularly fine clusters being observed west of Falls Church and near the boat landing at Mount Vernon.

"The journey to Easton, located on the eastern shore of Maryland over eighty miles from Washington, was especially interesting because Miss Mary E. Banning, a pioneer mycologist of Maryland was born in Talbot County. Dr. Kelly is preparing an account of her life and work. Her book of manuscript and drawings is at Albany having been donated by her to the State Museum about thirty years ago. A list of the species she col-

lected, comprising fourteen that were new, was published by Dr. Peck in his 44th annual report.

"A day and night were spent at the home of Dr. Kelly in Baltimore, where Mr. L. C. C. Krieger, a botanical artist of great ability, is busily engaged in preparing illustrations of the fleshy fungi."

Adjournment followed.

B. O. Dodge,
Secretary

December 9, 1919

The meeting was held at the American Museum of Natural History at 8.15 P.M. President Richards presided. There were 35 persons present.

The usual business was dispensed with. The Scientific program consisted of an illustrated lecture on "The Uses of Fungi and Bacteria in Industry" by Dr. E. W. Olive, Brooklyn Botanical Garden. A discussion followed the lecture, after which the meeting adjourned.

B. O. Dodge,
Secretary

January 13, 1920

The annual meeting of the club was held at the American Museum of Natural History at 8.15 P.M. President Richards presided. There were fifteen persons present.

The minutes of the meetings held November 29 and December 9 were approved.

Mr. Alexander Gershoy, Assistant in Botany, Columbia University, was nominated for membership.

A letter of resignation from Rev. L. H. Lighthipe was read and accepted. In recognition of his thirty-four years of faithful service in the Club, it was voted to transfer his name to the list of corresponding members.

Professor R. A. Harper, chairman of the Committee on Retrenchment, read the following report prepared by Professor T. E. Hazen, secretary of the committee. (See report appended.)

The recommendations of the committee were adopted with the additional provision that the committee be continued as a Committee on New Members.

A letter from The New Era Printing Company containing a schedule of new prices for the publication of the *Bulletin* was read by the Treasurer.

Annual Reports of the officers were then in order.

The Secretary reported that fourteen regular meetings and one special meeting had been held during the year at which the combined attendance was 414. Six illustrated lectures were given, at which the combined attendance was 211. Fifteen new members were elected during the year, six resignations had been accepted, and seven members had been dropped from the mailing list for non-payment of dues. This report was accepted and placed on file. The treasurer's report was read and referred to an auditing committee, to which the chairman appointed Dr. Barnhart and Dr. Howe.

The report of the editor, Professor A. W. Evans, was read by Dr. Howe. This report showed that the Bulletin for 1919 contained 500 pages, 19 plates and 46 text figures. The articles published embraced the following subjects: Ecology and Plant Geography, 2; Morphology and Taxonomy of Algae, 2; Fungi, 4; Bryophytes, 4; Vascular Plants, 8; Paleobotany, 1; Pathology, 1; Physiology, 2; Taxonomy of Vascular Plants, 8; total, 33. The report was accepted and placed on file.

Mr. Norman Taylor, editor of TORREYA, Dr. M. A. Howe, delegate to the council of the New York Academy of Sciences, Dr. M. Levine, business manager of advertisements and circulation, gave brief reports.

Professor H. M. Richards in his report as president of the Club commented on the various activities of the Club and made several constructive suggestions regarding the possibilities of securing a larger membership and a more extensive financial support.

Professor R. A. Harper, chairman of the Finance Committee, gave a brief report on the financial standing of the Club.

Dr. F. W. Pennell, chairman of the Field Committee, read a report, which was accepted and placed on file.

Dr. F. J. Seaver reported for the Program Committee, and Dr. Howe announced that Professor Setchell had consented to lecture before the Club in the near future.

Mr. Alexander Gershoy was then elected to membership.

The election of officers resulted as follows:

President, H. M. Richards.

Vice-Presidents, John Hendley Barnhart,
C. Stuart Gager.

Secretary and Treasurer, Bernard O. Dodge.

Editor, Alex. W. Evans.

Associate Editors,

Jean Broadhurst, J. Arthur Harris, Marshall A. Howe, Michael Levine, Arlow B. Stout, George E. Nichols, Norman Taylor.

Delegate to the Council of the New York Academy of Sciences, J. H. Barnhart.

Dr. M. Levine was reëlected Business Editor of Advertisements and Circulation.

The president appointed the following standing committees for 1920:

Finance: Prof. R. A. Harper, chairman, Dr. J. H. Barnhart, Miss C. C. Haynes and Mr. H. B. Douglas.

Buget: Dr. J. H. Barnhart, chairman, Prof. R. A. Harper, Dr. N. L. Britton, Prof. A. W. Evans, Dr. M. A. Howe and Prof. H. H. Rusby.

Field: Dr. F. W. Pennell, chairman, Mrs. L. M. Keeler, Mr. G. T. Hastings, Dr. F. J. Seaver, Mr. Norman Taylor, Dr. Michael Levine and Mr. Percy Wilson.

Program: Mrs. E. G. Britton, chairman, Dr. Jean Broadhurst, Dr. Alfred Gundersen and Dr. F. Seaver,

Membership: Dr. J. K. Small, chairman, Dr. T. E. Hazen and Dr. E. W. Olive.

The meeting adjourned at 10 P.M.

B. O. Dodge,
Secretary.

January 28, 1920

A meeting of the Club was held at The New York Botanical Garden at 3.30 P.M. President Richards presided. There were about twenty persons present.

The minutes of the annual meeting held January 13 were read and adopted.

Dr. Howe reported that the Auditing Committee had examined the books of Dr. B. O. Dodge, Treasurer, and found them to be correct.

Dr. B. O. Dodge, for the past nine years secretary and treasurer of the Club, because of his entrance upon scientific work in Washington, D. C., tendered his resignation from both offices. This was reluctantly accepted. The President appointed a committee of five, Drs. Harper, Howe, Barnhart, Rusby, and Richards, the last *ex-officio*, to consider the problem of the handling of the duties of these offices and to select a successor or successors. Awaiting the result of their action, Dr. F. W. Pennell was appointed temporary secretary and treasurer.

Mr. William C. Ferguson, Hempstead, L. I., was nominated and elected to membership.

The resignation of Dr. T. W. J. Burgess was accepted. That of Dr. O. E. White was referred to the Membership Committee.

The scientific program consisted of a joint discussion by Drs. Britton and Small on "Recent Explorations in Southern Florida."

Dr. Small gave an outline of the expedition of Dr. and Mrs. Britton and himself during late November and December of 1919 to southern Florida, telling of work around Miami and in the Everglades, and showing an extensive collection of remarkable plants seen. Among these were several species considered new to science, a *Monotropa* with ochroleucous flowers, an *Opuntia* and a *Houstonia*.

Dr. Britton spoke of his interest in comparing the flora of southern Florida with that familiar to him in the West Indies, especially in the Bahamas. Interesting evidence in the discovery of a considerable and deep limestone cave now sunk below sea-level but yet containing large stalagmites and stalactites, was discovered, showing the recent subsidence of the Everglade district.

Photographs were shown depicting a remarkably complete natural graft of the pigeon-plum.

Another purpose of the trip—that in which Mrs. Britton was particularly interested—was the collection of the lichen-flora.

The meeting adjourned.

FRANCIS W. PENNELL,
Secretary.

FEBRUARY 10, 1920

The first meeting in February was held at the American Museum of Natural History.

President Richards called the meeting to order at 8.30 P.M. There were 28 persons present.

No business was transacted.

Dr. F. W. Pennell gave an illustrated lecture on "Through the Andes of Colombia."

A brief account was given of the speaker's eight months' sojourn in Colombia in 1917–18, of the extent of exploration undertaken and of the collections made. Each of the three cordilleras of the Andes was ascended from the tropical lowland to the paramo above timber-line. Emphasis was laid upon the sharp delimitation of altitudinal zones of vegetation, and the views shown were largely of species characteristic of each.

FRANCIS W. PENNELL,
Secretary.

TORREYA

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SOUTHERN LOUISIANA FROM THE CAR-WINDOW

By Roland M. Harper

Louisiana is one of the two states in the Union that is all coastal plain (Florida being the other). The southern half of the state, although essentially flat and hardly anywhere more than 150 feet above sea-level, has considerable diversity of soil, which is reflected in the vegetation as well as in the population and agricultural features. The agricultural regions of the state were well mapped and described by Dr. E. W. Hilgard in the fifth volume of the Tenth Census, 1884, and the same divisions with slight modifications were used in a report on forest conditions in Louisiana by J. H. Foster (U. S. Forest Service Bull. 114. 1912*), and in a colored "Phytogeographic map of Louisiana," on a scale of about 18 miles to the inch, which has been issued in several editions in recent years by the State Department of Agriculture and Immigration. Additional geographical details can be found in the soil surveys of several parishes and similar areas published by the U. S. Department of Agriculture, and in Water Supply and Irrigation Paper 101 of the U. S. Geological Survey, on the underground waters of southern Louisiana, by G. D. Harris and others (1904), which contains among other things a map showing the distribution of forests, prairies and marshes in the neighborhood of Lake Charles.

Existing descriptions of the vegetation of southern Louisiana are not very numerous or voluminous. There are of course a few local lists of plants, and monographic works that cite Louis-

* Reviewed, with a reduced copy of the map, in Geog. Review **2**: 475–476. Dec. 1916.

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iana specimens, but those are of little interest to the plant sociologist. The vegetation of the several regions of the state was sketched by Hilgard in the census report above mentioned and in one or two preliminary papers that preceded it. Nearly fifty years ago Prof. A. Featherman of the Louisiana State University published two or three official reports on botanical surveys in Louisiana, and that for 1781 contains an interesting description of the prairies in the southern part of the state.

Prof. S. M. Tracy, in Bulletin 15 of the Division of Agrostology of the U. S. Department of Agriculture, 1898 (pp. 10–11), published some notes on prairie grasses of southern Louisiana, with a list of about 19 species, including several weeds. Andrew Allison, in a paper on the birds of West Baton Rouge Parish, in the Auk (**21**: 472–483) for October, 1904, devoted about two pages to vegetation, giving technical names of several of the most characteristic plants. In the same magazine for January, 1906, the same author and two others sketched the geography of the whole state, with a regional map patterned after Hilgard's, and a few notes on vegetation. In Torreya (**6**: 201–203) for October, 1906, I described the vegetation of some swamps near New Orleans as it appeared in midwinter.

Prof. R. S. Cocks, in Bulletin 7 of the Gulf Biologic Station at Cameron, La., published by the State Board of Agriculture and Immigration in 1907, entitled The Flora of the Gulf Biologic Station, devoted about two pages (out of 42) to classifying the plants in the vicinity of the station by habitat, and more than six pages to the flora of the prairies west of Lafayette. Two other papers by the same author, namely, Grasses of Louisiana (Bull. 10, Gulf Biol. Sta., 1908), and Leguminosae of Louisiana (Bull. 1, La. Nat. Hist. Surv., 1910), have assisted me in identifying the plants seen on the trips described below. Another interesting contribution by Prof. Cocks, dealing with a part of southern Louisiana that I have not seen, is the first of a projected series of "Notes on the Flora of Louisiana," in the Plant World (**17**: 186–191) for June, 1914, which describes the fertile loess hills north of Baton Rouge from a floristic standpoint.

My first opportunity to see any part of Louisiana west of New

Orleans came in July, 1915, when on the way from Florida to California. Leaving New Orleans shortly before midnight of the thirteenth on the main line of the Southern Pacific system (which operates in Louisiana under the aliases of Morgan's Louisiana & Texas R. R., and Louisiana Western), I traveled in a day coach so as to be able to begin taking notes as soon as there was light enough, although that deprived me of any protection from mosquitoes (for it would hardly be worth while to put screens on a car that runs all the way from New Orleans to Los Angeles and is exposed to mosquitoes only about one tenth of the distance). Daybreak (about 4:30 a.m.) on the 14th found me at Lafayette, 145 miles from New Orleans and just west of the alluvial bottoms of the Mississippi delta. The mosquitoes which had made sleep impossible during the night soon disappeared, and as the locomotive used oil for fuel there was nothing to interfere with botanical observations except the speed of the train and my unfamiliarity with some of the plants. Lake Charles, the metropolis of southwestern Louisiana, was passed a little before 7 o'clock, and the Sabine River at the western border of the state about 7:45.

A little over three years later, when on the way to Texas on an errand for the U. S. Bureau of Plant Industry, I crossed Louisiana by a different route, a little farther north. On the afternoon of August 19, 1918, I went from New Orleans to Baton Rouge by the Yazoo & Mississippi Valley R. R., and on the 20th from Baton Rouge westward to the Sabine River and beyond by the New Orleans, Texas & Mexico Ry. (Gulf Coast Lines, formerly a part of the Frisco System), which uses the Y. & M. V. tracks southeast of Baton Rouge and the Kansas City Southern from DeQuincy, La., to Beaumont, Tex., and burn oil like the Southern Pacific and several other southwestern railroads. The two trips together took me through four or five different kinds of country, whose vegetation will be sketched below.

The flood-plain and delta of the Mississippi River have generally been mapped as a unit in Louisiana, except for the separation of the treeless marshes near the coast from the originally densely wooded portion farther inland. There are some sig-

nificant differences, however, between the alluvial lands at the northern edge of the state and those in the latitude of New Orleans. The soil of extreme northeastern Louisiana is hardly surpassed in productiveness anywhere in the world; but there is a progressive decrease in fertility going downstream from there, for two different—but not wholly independent—reasons. First, on approaching the mouth of the river the seasonal fluctuation of the water diminishes, and with it the opportunities of the soil for aëration;* and second, because of the pronounced increase of late summer rainfall toward the Gulf coast, the soils in that direction must be more thoroughly leached.† The variations in soil fertility are brought out very well by census statistics on the use of commercial fertilizers.‡ In 1909 the farmers in the alluvial parishes above Baton Rouge spent only 7 cents for fertilizers for every acre of improved land in 1910, those between Baton Rouge and New Orleans $1.23, and those below New Orleans $2.22.

In northern Louisiana the alluvial lands are largely devoted to cotton, while about Baton Rouge sugar-cane becomes the leading crop, and that gradually gives way to rice below New Orleans. A northeast-southwest line drawn across the delta a little above Baton Rouge separates the cotton and sugar-cane regions pretty well, and the difference is reflected in the vegetation, as will be shown farther on.

The Sugar-cane Region

From New Orleans to Baton Rouge (88 miles) and about ten miles west of the latter place, or about to the boundary between the parishes of West Baton Rouge and Pointe Coupee, I was in the sugar-cane region, where vast fields of cane, hiding all but the roofs of the one-story houses, are the most conspicuous feature of the late summer landscape. Corn and rice rank next to cane in acreage, the former often planted with velvet beans or sugar-cane in alternate rows. Rice was being threshed at the time I passed by, and the piles of chaff were often burned to get

* See Torreya **11**: 223. 1911.

† See Science II. **48**: 208–211. Aug. 30, 1918.

‡ See Science II. **42**: 500–503. Oct. 8. 1915.

rid of them. The houses are mostly aggregated in villages, each village with its sugar-mill. Water for domestic purposes is generally taken from cisterns, as in numerous other fertile regions. The forests are reduced to scattered remnants, mostly along streams. The commonest trees seem to be *Salix nigra* (?), *Populus deltoides, Liquidambar, Platanus, Taxodium distichum, Ulmus americana,* and *Celtis* sp., in the order named. There are hardly any erect shrubs, but three woody vines, *Rhus radicans, Tecoma radicans,* and *Ampelopsis arborea* are fairly common. The epiphyte *Tillandsia usneoides* is the only native herb that is at all conspicuous, the other herbs noted being mostly weeds, such as *Ambrosia trifida* and *Paspalum Vaseyanum*.

The Cotton Region

From about Westover to Opelousas, 49 miles, on the Gulf Coast Lines, the country is still flat and alluvial, but about half wooded, with less cane and more cotton than had been seen the day before. Several sawmills were passed, and the forests had been damaged a good deal by lumbering, draining, grazing, etc. The commonest plants in that distance, which is through the cotton region of the Mississippi bottoms, seem to be as follows:

Trees

Liquidambar Styraciflua
Salix nigra (?)*
Taxodium distichum
Acer Drummondii (?)
Celtis sp.
Populus deltoides
Quercus texana (?)
Gleditsia triacanthos
Fraxinus americana (?)
Quercus nigra
Hicoria aquatica (?)
Acer Negundo

Shrubs and Vines

Ampelopsis arborea
Rhus radicans
Sabal glabra
Cephalanthus occidentalis
Tecoma radicans
Brunnichia cirrhosa

* If this is *S. nigra* it grows taller and straighter here than it usually does elsewhere.

Herbs (all weeds)

Chamaecrista robusta (?)	*Verbena angustifolia* (?)
Helenium tenuifolium	*Piaropus crassipes*
Croton capitatus	

The Prairies

Dr. Hilgard distinguished three kinds of prairie in southern Louisiana, all contiguous, namely, brown loam on the northeast, gray silt on the west, and black calcareous on the south, next to the coast marshes. I crossed all three, but on account of the relatively small extent of natural vegetation remaining and the inherent difficulty of identifying herbs from a fast train, on a route traversed only once, I will not attempt to separate them at this time. On the more southerly route the ground-water level is pretty close to the surface, and the railroad is built on a low embankment most of the way, while on the other route, 15 or 20 miles farther north, the prairies are comparatively high and dry (though not over 75 feet above sea-level), which probably makes as much difference in the vegetation as the composition of the soil does.

The prairie country stretches westward from Opelousas and Lafayette at the edge of the Mississippi bottoms to the bottoms of the Calcasieu River, and like most prairies is almost perfectly level. Toward the western edge, however, in the gray silt prairies, there are numerous low mounds rising a foot or so above the general level, which make the vegetation a little more diversified than it would be otherwise. There are also quite a number of strips and patches of timber, mostly along streams, so that one hardly ever has an unobstructed view of more than two or three miles in any direction. Eastward the trees are all deciduous, but toward the west pines appear in increasing numbers, mostly *Pinus Taeda* on the northern route and *P. palustris* on the southern route. Where the prairie is bordered by deciduous forests the boundary is sharp, but the edge of the pine forest is ill-defined, probably on account of fire, as on the Hempstead Plains of Long Island.*

* See Mem. Torrey Club **17**: 271. 1918.

The original prairie vegetation is now nearly all replaced by fields and pastures. In St. Landry Parish sometimes as many as fifty farm-houses can be seen at once, between stations, each with a few trees around it, and most of them with "French" chimneys of sticks and mud. Water is usually obtained from cisterns, as in the delta. Rice, corn and cotton are the leading crops, in order of acreage. The commonest native and naturalized plants seem to be as follows:

TREES

Liquidambar Styraciflua
Pinus Taeda
Quercus stellata
Pinus palustris
Quercus Phellos
Hicoria alba
Nyssa sylvatica (?)
Quercus falcata
Quercus Michauxii
Taxodium distichum

SHRUBS

Myrica pumila
Cephalanthus occidentalis
Baccharis halimifolia

HERBS

Paspalum Vaseyanum
Panicum hemitomon
Helenium tenuifolium
Eryngium yuccifolium
Mesadenia lanceolata
Tillandsia usneoides
Hibiscus incanus (?)
Nama ovata (?)
Gaura Lindheimeri
*Baptisia leucophaea**
Dracopis amplexicaulis (?)
Croton capitatus
Silphium laciniatum
Typha latifolia
Baptisia sp.
Sesbania macrocarpa (?)

The trees are mostly along streams, as above stated, and *Myrica pumila* occurs near the pine forests, especially on mounds, where it can keep its roots reasonably dry. The first and third herbs listed are obnoxious weeds, and the second grows in wet places

* In Robinson & Fernald's Manual this is treated as synonymous with *B. bracteata* Ell., a species known only from dry woods in Georgia and Alabama (see Bull. Torrey Club **33**: 533. 1906), but the range attributed to it excludes those two states entirely.

and may be more characteristic of the marshes south of the prairies.

Outside of Louisiana and Texas these prairies probably have their nearest counterpart in the Grand Prairie of Arkansas,* which although considerably nearer to centers of ecological activity is even less known botanically than the Gulf coast prairies.

The Long-leaf Pine Region

West of the prairies are the long-leaf pine forests, about fifty miles wide on my northern route, but hardly extending south of Lake Charles at all. The topography where I crossed is gently rolling (doubtless a little more hilly farther north), with grayish loamy soil and clayey subsoil, and very few streams (unlike most of the pine-barrens of the Atlantic slope, where the sandy soil holds considerable water which seeps out in the valleys gradually throughout the year). Mosquitoes were rather abundant, though, strange to say. The region is very sparsely settled, and even yet lumbering seems to be more important than farming.

Pinus palustris outnumbers all other trees by a large majority, and on uplands where the lumberman has not yet begun operations it makes a pure stand with no woody undergrowth of any kind. These pine forests are denser than most of those east of the Mississippi River, as observed long ago by Dr. Mohr,† who found, probably in what is now Beauregard Parish, 35,000 board feet on a single acre,—which is several times the average for the southeastern pine forests.

Just two weeks before my 1918 visit southwestern Louisiana had been swept by a hurricane, and in some places as many as 10 per cent. of the pines had been blown down, and many leaves and branches stripped from the deciduous trees. The commonest trees besides the long-leaf pine seem to be *Nyssa biflora* (?), *Liquidambar, Pinus Taeda, Magnolia grandiflora, Quercus Michauxii, Fagus, Nyssa uniflora, Quercus falcata, Q. alba, Taxodium distichum,* and *Ilex opaca,* in the order named. These

* See Plant World **17**: 40–44. 1914.

† See page 45 of the revised edition of his "Timber pines of the southern United States" (U. S. Forestry Bull. 13), 1897.

are chiefly confined to the vicinity of streams, like the trees in the prairies. The only common shrubs seem to be *Callicarpa Americana* and *Myrica cerifera*. The herbaceous flora was difficult to identify from a moving train, but it seems decidedly poorer in species than that of the southeastern pine-barrens, and not many plants were in bloom in August. The most abundant herb is a coarse grass, presumably an *Andropogon*, and the most conspicuous were two species of *Laciniaria*, which I have guessed to be *L. pycnostachya* and *L. acidota*. (A little later I had opportunity to examine the pine-barrens more closely in eastern Texas, and the results are published in the *Bulletin* for July, 1920.*

The Hammock Forests

Within a few miles of the Sabine River the country is low and clayey and probably occasionally inundated, though the soil would hardly be classed as alluvial. These conditions are unsuited to long-leaf pine, and the forests are comparatively dense and hammock-like, with approximately the following composition:

Trees

Pinus Taeda	*Quercus Phellos*
Liquidambar Styraciflua	*Quercus falcata*
Nyssa uniflora	*Quercus stellata*
Quercus Michauxii	*Quercus Marylandica*
Taxodium distichum	*Hicoria aquatica* (?)

Shrubs

Cephalanthus occidentalis	*Aralia spinosa*

Herbs

Tillandsia usneoides

Most of these are the same species already noted as growing along streams in the pine-barrens, and this might be regarded as merely one of the strips of bottom-land timber, but for the fact that it is considerably wider on the Texas side, where it deserves to rank as a distinct region.

* Bull. Torrey Club 47: 289–319. 1920.

The foregoing notes, incomplete as they are (being based on only about eleven hours of travel), may be useful to those who may hereafter study Louisiana vegetation more intensively; and they illustrate a method of making observations in comfort in an interesting area where mosquitoes and scarcity of water might make traveling on foot rather disagreeable in summer.

THE VALUE OF NUTRIENT SOLUTIONS AS CULTURE MEDIA FOR FERN PROTHALLIA*

By Elizabeth Dorothy Wuist Brown

The value of nutrient solutions as culture media for growing fern prothallia under experimental conditions being so well known, it is the purpose of this paper to emphasize the value of these solutions for growing prothallia for class use. Excellent cultures may be obtained by using soil, peat and various other media, but it has been the writer's experience that the work is greatly simplified by the use of the nutrient solution. For after the solutions have been prepared and the cultures set up under the best light conditions available, little attention need be paid to them.

Aside from the time-saving element in caring for the cultures is the advantage of having an abundance of material in various stages of development always at hand. In this way it is possible for the student to follow the development of the prothallia from the one-cell stage to the adult form bearing antheridia, archegonia and sporophytes. This may be accomplished by varying the time of sowing the spores in the different cultures. It is well to learn the length of time required for the germination of the spores and the development of the prothallia of the particular species used before setting up the cultures for class use. The time of germination varies somewhat in different species, being more rapid in the spores containing chlorophyll.

The following solutions, Beijerinck's, Borner and Lucanus's, Knop's, Prantl's and Sachs's, proved favorable for the germina-

* Contribution from the Osborn Botanical Laboratory.

tion of the spores and the development of the prothallia of the various species of the Polypodiaceae used. However, Knop's and Prantl's solutions were on the whole the best suited, espe-

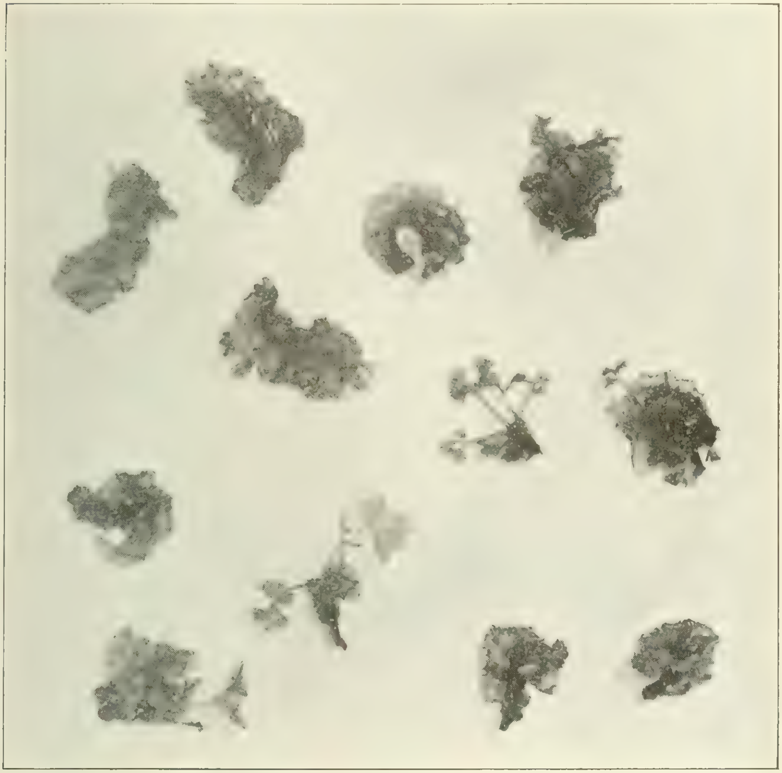

FIG. 1. Prothallia and young sporophytes of *Onoclea struthiopteris* from various nutrient solution cultures.

cially the latter as it did not seem favorable for the development of algae. The formulas for making up these solutions are as follows:

1. BEIJERINCK'S SOLUTION.

NH_4NO_3	0.5 g.
KH_2PO_4	0.2 g.
$MgSO_4$	0.2 g.
$CaCl_2$	0.1 g.
$FeCl_3$	trace.
Distilled water	1000 c.c.

2. Birner and Lucanus's Solution.

$MgSO_4$	0.5 g.
$Ca(NO_3)_2$	1.5 g.
KH_2PO_4	1.0 g.
$FeCl_3$	trace.
Distilled water	1000 c.c.

3. Knop's Solution.

$MgSO_4$	0.25 g.
$Ca(NO_3)_2$	1.00 g.
K_2HPO_4	0.25 g.
KCl	0.12 g.
$FeCl_3$	trace.
Distilled water	1000 c.c.

4. Prantl's Solution.

K_2SO_4	0.7 g.
NaCl	0.23 g.
$CaSO_4$	0.7 g.
$MgSO_4$	0.5 g.
NH_4NO_3 solution, 0.064 per cent	20 c.c.

5. Sachs's Solution.

KNO_3	1 g.
NaCl	0.5 g.
$CaSO_4$	0.5 g.
$MgSO_4$	0.5 g.
$CaHNO_4$	0.5 g.
Distilled water	1000 c.c.

Experience has shown that it is best to omit the ferric chloride from the stock solutions and to add a drop of a 1 per cent solution of ferric chloride to the nutrient solution of each culture before the spores are sown.

It is best to make up a liter of the nutrient solution, being very careful always to use only pure chemicals and distilled water. It is not necessary to sterilize the solutions, in fact cultures seem to do better on unsterilized solutions, especially those containing ammonium nitrate, probably because of chemical changes caused by heating.

Solutions should be kept in flasks or bottles well-stoppered with cotton in a clean place. Great care must be exercised in opening the flasks in the laboratory or the solutions will become

contaminated with algae or fungi. This is especially true when replenishing the culture media after the prothallia have begun to develop. Solutions should never be poured directly from the stock flasks or bottles into the culture dishes but they should be poured into a clean graduate, beaker or other receptacle and from this into the culture. In this way it is often possible to keep

FIG. 2. Young sporophyte growing in Knop's Solution

the stock solutions pure, althoug the cultures have become contaminated. However, if they do become infested it is best to throw them away and, after cleaning and sterilizing the flasks, prepare new solutions.

In making up solution cultures it is possible to use a glass dish of any size which can be covered with a glass lid or plate, but on

the whole small glass capsules about $1\frac{1}{4}$ inches high, with a diameter of $2\frac{1}{2}$ inches, seem best suited. These hold about 26 c.c. of nutrient solution. This amount of nutrient solution will provide sufficient nourishment for a large number of prothallia to grow to maturity. However, owing to evaporation, it will be necessary to add fresh solution from time to time. The advantages of using a dish of this size are many: it is easily handled by both student and teacher; it can be placed under a compound microscope and the growth of the culture observed; it does not occupy so much space on the laboratory table and therefore is not so liable to accident; and, if by chance it does meet with one or becomes too badly infected by algae or fungi, its loss is not so great. Sometimes a culture may be freed from an algal or fungous growth by lifting the prothallia with a sterilized seeker or sharp-pointed scalpel from the old solution to a new one in a clean dish. Care must be taken not to immerse the prothallia in the solution, for if this accidentally happens it will require care to make them remain on the surface afterward. Sometimes this can be accomplished by drying the upper surfaces of the prothallia with filter paper. For study by a class in beginning botany it is perhaps best to select a fern whose prothallia under normal conditions are monoecious. For this reason various species of *Aspidium* or *Camptosorus rhizophyllus* may be used, although the rarity of the latter often makes this impracticable. Among a large number of the so-called "dioecious" prothallia, especially in the older cultures, a large percentage of monoecious prothallia occur. It is also possible by allowing cultures of various species in which large, vigorous, dioecious female prothallia predominate to become poor in nourishment and in this way to lower their vitality and thus convert them into monoecious prothallia. One way to do this is not to replenish the media with new from time to time, but to allow the prothallia to continue their growth on the same solution upon which the spores have been sown. Since this requires practice and skill in handling the prothallia as well as an acquaintance with the prothallia of the particular species under cultivation, it will hardly be practicable in most cases, unless one

wishes to demonstrate the effect of nourishment on the development of the reproductive organs in fern prothallia.

Fertile fronds of the species to be used should be collected as soon as the spores are ripe. After drying them, by placing them before an open window for a few days, they should be wrapped in paper and placed in a covered pasteboard box in a cool, dry place. When preparing the spores for sowing, shake a frond over white paper or a clean glass plate. Crush the sporangia obtained with a scalpel or a microscopic slide, being very careful not to crush the spores. The spores should be freed from the remains of the sporangia before sowing them and this may be done by rubbing the crushed mass through a sieve of varying thicknesses of silk bolting cloth (which may be procured from a flour mill) stretched in a small embroidery hoop. By adding or removing a thickness of the cloth the grade of the sieve can readily be adjusted.

The most successful of the various methods tried for sowing the spores is as follows: A mass of spores is taken on the point of a scalpel and the instrument is moved over the capsule about half an inch above the surface of the medium, while the spores are gently blown upon. In this manner the spores are fairly evenly distributed. This should be done as quickly as possible and the cover of the capsule replaced in order that the culture medium is not exposed so long to the air. Likewise, whenever examining or removing prothallia from a culture, do not leave it uncovered any longer than is necessary. Never invert a cover. It is well to make up a number of cultures, one or two for each table of the different laboratory sections with a few in reserve.

After the cultures are made it is best to place them before a window, preferably an east window, where they are exposed to the direct sunlight for a part of the day. This is especially necessary during the period of germination. If the cultures are started in warm weather it is best not to allow them to remain in the sunshine longer than one or two hours at a time as the prothallia do not develop as well when the culture solution becomes heated. The spores of some species fail to germinate if the culture solution remains too warm. The optimum temperature for

prothallia is 60° F., although they will continue to do well in a room whose temperature is much higher provided the culture solution is not allowed to become overheated by exposure to the sun's direct rays.

Cultures may be labelled in various ways, but the most convenient one is to write on the cover of the capsule near the edge with a glass pencil the name of the species, the solution used for the culture medium and the date of sowing the spores. By abbreviating the name of the species and by the use of either a letter or Roman numeral for the culture solution and of figures to indicate the date, the inscription need not occupy much space. For example, "A. S.—P.—11/4 '20" = *Aspidium spinulosum,* Prantl's Solution, November 4, 1920. Although it is not absolutely necessary to label the cultures if only one species and one culture solution are used, still it is well to have the date when the spores were sown indicated.

When the prothallia are distributed for laboratory study, it is best to remove a part of the culture to a watch glass, being careful to use clean instruments and to return the cover to the capsule as soon as possible. Under a dissecting microscope by means of needles, the prothallia may then be teased apart, as the rhizoids frequently become interwoven, and placed in another watch glass from which to be distributed to the students. In this way the students secure better mounts, a great deal of time will be saved and a waste of material avoided. If more prothallia have been removed from the culture than are needed immediately, the remainder can be kept in excellent condition by adding a few drops of water and placing the watch glass in a moist chamber. This moist chamber can be made by inverting a bell jar over a plate in which a little water is allowed to stand. The prothallia may be returned to the culture if care is used not to submerge them as has been previously stated.

Young sporophytes may be removed from the culture and placed in watch glasses containing nutrient solution, supported by tiny pebbles in such a manner that the young leaves are above the solution and the young root immersed (Fig. 2). The watch glass should be covered with a bell jar. These sporophytes

can be kept alive for months if care is taken to replenish the nutrient solution and not to expose the young sporophyte too long to the dry atmosphere of the laboratory.

These details of technique have been the gradual outgrowth of the writer's experiences with many cultures of fern prothallia of the various species of the Polypodiaceae. Especial emphasis is laid upon careful and painstaking attention to details, and it is only by experience that the value of so doing will be understood and appreciated.

TWO NEW WEST INDIAN PLANTS

By N. L. Britton.

An Undescribed Stenophyllus from Jamaica

The species of the sedge genus *Stenophyllus* hitherto known to inhabit Jamaica* are *S. junciformis* (H. B. K.) Britton, which has been collected in Clarendon and St. Andrew's, and *S. capillaris* (L.) Britton, definite localities for which are at present unknown.

To these, Mr. William Harris has recently added an undescribed one, growing on a damp rocky slope at Old England Falls at about 1100 meters elevation in the Blue Mountains to be named and characterized as follows:

Stenophyllus Harrisii sp. nov.

Densely tufted, with short rootstocks. Culms weak, glabrous, about 6 dm. long and 1 mm. thick; leaves reduced to basal sheaths bearing ciliate blades 3 cm. long or less; spikelet solitary, about 8 mm. long, subtended by one or two appressed bracts 5–6 mm. long; scales few, ovate to ovate-oblong; style-branches 3; achene obovoid, trigonous, about 0.7 mm. long, its broad top bearing a minute black tubercle.

Old England Falls, Jamaica (*Harris 12908, type; 12890*). In *12890* most of the spikelets are transformed into tufts of short linear leaves.

* Bull. Torrey Club 43: 447.

An Undescribed Croton from the Virgin Islands

Croton Fishlockii Britton, sp. nov.

A low, much-branched shrub, the young twigs sparingly long-pilose, with very short internodes. Leaves broadly elliptic to suborbicular, rather thin, 6–22 mm. long, 5–15 mm. wide, rounded or obtuse at both ends, pinnately few-veined, sparingly long-pilose and with rather copious black stellate hairs, the long-pilose petioles 2–8 mm. long; flowers few, in small terminal clusters, or solitary. Staminate flowers: sepals ovate to elliptic-ovate, 2.8–3 mm. long, 1.8–2 mm. broad, stellate-pubescent on the back; petals obovate to broadly obovate, 3 mm. long, 2–2.2 mm. broad, villous within; stamens 12, the filaments villous near the base.

Top of the mountain in Virgin Gorda, Virgin Islands, at about 425 meters altitude (*W. C. Fishlock, No. 311,* May 9, 1919).

A very interesting distinct species, related to *Croton lucidus* L. I take pleasure in dedicating it to Mr. Fishlock, who has been in charge of the Botanical Station at Roadtown, Tortola, for a series of years, and who has made extensive collections of the Virgin Island flora, adding greatly to our knowledge of the distribution of species of Tortola, Virgin Gorda and Anegada. *Croton lucidus* L., apparently its nearest relative, has not been found in the Virgin Islands.

REVIEWS

Hitchcock's Genera of Grasses of the United States*

At the present low ebb of systematic botany, due largely to the deplorable schism over the question of nomenclatorial rules, the appearance of a work of such scope from the pen of our leading agrostologist is of capital importance to every student of the grasses. Sufficient time has elapsed since the publication of Scribner's American Grasses in 1900† to make a new exposition of grass-genera extremely desirable. Many of the views set forth in the present volume were foreshadowed in the author's

* Hitchcock, A. S., The Genera of Grasses of the United States, with special reference to the economic species. U. S. Dept. of Agric. Bull. No. 772: Washington, Govt. Printing Office, March 20, 1920. Pp. 1–307; 174 figs., 20 plates. Price .40.

† U. S. Dept. Agr. Div. Agrost. Bull. 20.

Text-Book of Grasses (1914), but a fuller and more adequate treatment was urgently needed. Professor Hitchcock's sound and sane conservatism has not permitted him to depart too widely from the fundamental doctrines of modern agrostology yet the present work is by no means a mere compilation of existing views, but marks in several respects a distinct advance over our previous knowledge.

The attention of the reviewer naturally was first drawn to that stone of stumbling and rock of offense, the correct position of the tribe Oryzeae. The Gordian knot has been neither untied nor cut. After following Hackel and Scribner by placing the tribe in the sub-family Panicatae in the Text-Book of Grasses, Professor Hitchcock has now returned to the view taken in his revision of the Gramineae for the Seventh Edition of Gray's Manual (1908), and included the tribe again among the Poatae. Evidently therefore the laterally-compressed spikelets now appear to him a character of greater significance than the articulation of the rachis *below* the glumes. As a matter of fact, the tribe presents an *impasse* that can never be satisfactorily evaded as long as the two sub-families are delimited as at present. Undoubtedly there will always be good grounds for maintaining these two series for the majority of the genera; but there is a progressive obliteration of sharply-opposed characters as we descend toward the median line, until we reach a debatable ground in which the two sets seem to be inextricably blended. Perhaps the most noteworthy advance in taxonomy afforded by the present volume is in the new sequence of tribes. The arrangement that has been uniformly followed hitherto has been strikingly illogical, in that it involved a progression from the most highly-developed to the most primitive forms. The bamboos, as showing the least differentiation in floral structure, should evidently begin the sequence, and the allies of *Tripsacum* should close it as the most complex We accordingly find in the present work that the Poatae stand first, with the tribes in the following order: Bamboseae, Festuceae, Hordeae, Aveneae, Agrostideae, Nazieae, Chlorideae, Phalarideae, Oryzeae and Zizanieae (the latter tribe cut off from Oryzeae on the basis of the unisexual spikelets, leaving only

Oryza and *Homalocenchrus* to represent the original tribe), and the Panicatae are in second place, in the order: Melinideae, Paniceae, Andropogoneae and Tripsaceae (the latter name very properly taken up instead of Maydeae, since the genus *Mays* is no longer maintained). The author is careful to point out, however, that no arrangement in a purely lineal sequence can represent the tribal relationships, and repeats the view set forth in his Text-Book (p. 157), that the phylogenetic development has not been along a *single* line. At least three dimensions would seem necessary to a satisfactory schematic representation of this relationship! Here is foreshadowed the great future problem to be solved by grass-systematists. The placing of Nazieae among the Poatae seems to be justified by the articulation of the spikelet *above* the glumes; and the near relation of *Hilaria* and *Aegopogon* to certain of the Chlorideae suggests to the author a disposition by which these two genera will ultimately be cut off from *Nazia* and its allies. Whether the distinction between Zizanieae and Oryzeae can be maintained for the genera not represented in the United States which are usually referred to Oryzeae, notably the anomalous *Streptochaeta* and *Reynaudia*, the author does not attempt to decide. Another noteworthy innovation is found in the placing of *Munroa* among the Chlorideae, where it finds a place next to *Cathestecum*, previously transferred in the same way by Griffiths* from the Festuceae. The genus *Triodia* is restored, with the comment that it does not seem practicable to segregate any of the species as distinct genera. The name *Aira* is taken up for what has been known as *Deschampsia*, the author holding that the Linnaean type should be selected from among the first four rather than the last two species (*A. praecox* and *A. caryophyllea* being species from southern Europe, and not included by Linnaeus either in the Flora Lapponica or Flora Suecica). The little annuals heretofore called "Aira" are placed in Adanson's genus *Aspris*.† *Melica* is not subdivided, although the presence of the club-shaped rudiment is maintained as a distinguishing character—a procedure which makes the reference of

* Contr. U. S. Nat. Herb. 14: 358. 1912.

† Adans. Fam. Pl. 2: 496, 522. 1763.

any species of the section *Bromelica* to the genus a matter of extreme difficulty for the beginner.

The author adopts Piper's* view that what has been known as *Agrostis alba* L. should be called *A. palustris* Huds., the original name having been founded on what was almost certainly a species of *Poa*; and *A. capillaris* L. is in like manner taken up for what has usually been called *A. alba* var. *vulgaris* Thurb., the "Rhode Island bent." *Apera* is regarded as insufficiently distinct from *Agrostis* and replaced in that genus. *Sphenopholis* and *Koeleria* retain the position among the Aveneae to which Professor Hitchcock has always regarded them as entitled.

The synonymy is complete for all generic names based on American species; and all such names, whether valid or in synonymy, are placed on a type-basis. A careful study has been made of each genus with a view to ascertaining which of the species the author had chiefly in mind, so that the arbitrary method of selecting the first-mentioned valid species as the type is avoided. A brief of the publication of each generic name is given, and in each case the reason for selecting the species taken as the type is stated. The law of priority is strictly applied, and the "nomina conservanda" of the International Rules are in no case maintained. Each genus is technically described, and its scope and distribution indicated. As was inevitable in a publication of the Department of Agriculture, all the economic species under each genus are mentioned, so that the user of the book should be able to refer any of these species to its proper genus. The author's interest in his subject, however, often leads him to extend his treatment to include species of no economic significance.

The illustrations with two exceptions (*Euchlaena* and *Coix*) are all new, and specially prepared for this work, the habit-drawings by Mary Wright Gill, and the details of the spikelet by Agnes Chase. The figure of *Hydrochloa carolinensis* on p. 213 is an admirable example of the fidelity and accuracy of Mrs. Gill's work. The high cost of paper is doubtless responsible for placing a photographic plate on *each* side of the inserted leaves.

* U. S. Dept. Agric. Bull. 692. 1918.

One new species (*Epicampes subpatens,* from New Mexico) is published, and fourteen new combinations are formally made.

The proofreading has been done with the most scrupulous care, in pleasing contrast to the carelessness displayed in some of our recently-issued manuals. The reviewer is inclined to regard Beauvois's correction* of Rafinesque's "Diarina"† to *Diarrhena* as valid under any set of rules; but Rafinesque's lordly indifference to all matters etymological makes it inadvisable to be dogmatic in regard to the correct spelling. It is doubtless an excess of purism to inquire why *Lepturus* is treated as feminine and *Pholiurus* as masculine (pp. 105, 106). *Chaetochloa palmifolium* (p. 243) is the only other error in agreement observed. The word "palea" is used throughout instead of the Anglicized "palet," thus conforming to "lemma"; but strict consistency would also require the use of "gluma."

Cynosurus cristatus is not "the only species in the United States" (p. 68), as *C. echinatus* L. is becoming well established in Western Oregon. *Coleanthus* is regarded as "introduced" (p. 133), although it is hard to see on what ground, since it is nowhere an associate of cultivated plants, and has a sufficiently wide distribution in Eurasia to justify the presumption that it is a cosmopolite. *Torresia macrophylla* is not merely "Californian," (p. 201) but extends northward at least to the Columbia River. *Homalocenchrus oryzoides* is not limited to the "eastern United States" (p. 206) but is of frequent occurrence in the Wilamette Valley.

Those who have followed in successive publications the steady evolution of Professor Hitchcock's views on systematic agrostology, will hope that this admirable contribution may in future find its logical culmination in an equally sound and able treatment of all the grass-species represented in the United States, which will be for the entire family what Hackell's exposition of the Andropogoneae has been for that tribe, and will for all time confirm the author's right to rank as a worthy continuator of the work of Beauvois, Trinius and Hackel. JAMES C. NELSON

* Ess. Agrost. 142. 1812.

† Med. Repos. 5 : 352. 1808.

PROCEEDINGS OF THE CLUB

February 25, 1920

A meeting of the Club was held at 3.30 P.M. at The New York Botanical Garden. Dr. H. A. Gleason presided. There were 21 persons present.

The minutes of the meetings held January 28 and February 10 were adopted.

Mr. William T. Arnold and Mr. Charles E. Fairman were elected to membership. The resignation of Dr. O. E. White was accepted. The death on November 8, 1919, of Mr. E. C. Wurzlow was noted.

Dr. R. A. Harper, on behalf of the committee charged with the selection for nomination of a candidate or candidates for the offices of Secretary and Treasurer, reported, suggesting Dr. F. W. Pennell for both these positions. The joint tenure of these offices has been found of much convenience. Dr. Pennell was elected Secretary-Treasurer.

The Treasurer was authorized to renew insurance upon our stock in the basement of the library of Columbia University.

The resignation of Dr. Pennell as Chairman of the Field Committee was accepted.

The scientific program consisted of two titles:

Dr. H. M. Denslow discussed "Our Native Orchids." After an introduction telling of his own long acquaintance with the orchids of our northeastern, and especially our local, flora, the speaker entered upon his real theme. This considered first the status of our knowledge of orchids; emphasizing the limitation of present knowledge and stating as reasons for this (*a*) the shortness of flowering-season of some species, (*b*) the minute size of flowers and general inconspicuousness of some species, (*c*) the unexpected habitats of some species, and (*d*) the sporadicity of occurrence of yet some species. Then he called our attention to the imperfect representation in herbaria, and locally in our Club collection at The New York Botanical Garden, of our orchids, emphasizing the need of a collection sufficiently ample to show us the distribution of each sort. The same want is evi-

dent in the Garden's own herbarium. The speaker insisted upon the urgent need of soon building ample herbaria as, because of the increasing rarity and even disappearance of certain species, it will later be impossible to obtain such data.

For the obtaining of information concerning our orchid-life Dr. Denslow suggested: (*a*) more state and other local floras (studies to give status of orchids and other plants in the same waning condition), (*b*) exploration, (*c*) increase of our herbarium, and toward this he advocated a system of exchanges. For the recording of our information as to species-ranges, and our help in realizing where exploration is most needed, he advocated plotting known areas of occurrence upon blank outline maps.

Dr. Denslow closed with the injunction that in the next ten or fifteen years we must discover whatever we wish to know concerning the occurrence or many native orchids—therefore "be up and doing!"

Dr. Alfred Gundersen showed and discussed "Labels and Records for Herbaceous Plants." The Brooklyn Botanic Garden has had difficulty with the wanton transference or removal of labels from the beds for herbaceous plants. The resulting confusing of data was first obviated by the mapping of their plantings; still for the public who had to depend upon the labeling present, this was not sufficient. Finally, after a series of experiments, there has been adopted a metal two-faced label, firmly secured to a post and so placed between two plantings on each side that each wing of the label and each face of each wing will designate a planting, the whole labeling four plantings. The permanence and obvious economy of such a label should lead to its wide adoption.

The meeting adjourned.

Francis W. Pennell,
Secretary

TORREYA

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HABITS AND HABITATS OF THE NORTH AMERICAN RESURRECTION FERN

By E. F. Andrews

This interesting little plant, known to science as *Polypodium polypodioides,* is closely related to the common polypody (*P. vulgare*) of the North, and one of its local names, "Little Polly," is evidently a popular recognition of the relationship. Other common local names are "fern moss," "moss fern," "tree fern"—from its epiphytic habit of growing on the trunks of trees—and more generally, "resurrection fern," from the manner in which it shrivels up during dry weather as if dead, and comes to life again after every shower of rain.

It is said to be sometimes found as far north as southern New York, and Pennsylvania, whence it ranges west to Illinois and Missouri and south to Florida and Texas, and on throughout tropical America. In the warm, moist climate of our southern coastal plain it finds a congenial home, and is so conspicuous on the live oaks there as to create the impression among tourists and other casual visitors that it does not grow on any others; but this is because they don't look for it anywhere else. Mrs. A. P. Taylor, of Thomasville, Ga., a very competent observer, writes: "It may be of interest, especially to those who believe in its preference for the live oak, to know of the various trees on which I have found it; . . . Here (around Thomasville) it grows on oaks, beech, maple, magnolia (*grandiflora* and *glauca*), *Oxydendron, Osmanthus,* tulip tree, *Symplocos, Cliftonia,* China tree (*Melia Azedarach*) and red cedar. I have never seen it on *Taxodium* or *Pinus.*"

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In the part of its range with which I am best acquainted, the middle and northern portions of Georgia and Alabama, its favorite hosts are the post oak, the elm, and tulip tree, though it is found in greater or less abundance on many others. I have even seen it on the stem of a large poison oak vine (*Rhus radicans*) that had climbed the trunk of an old tulip tree on which the fern had established itself. But so constant is its preference for the elm and post oak that its presence is a convenient test for dis-

FIG. 1. Post oak on a street in Washington, Ga.; the trunk and lower branches covered with a growth of Resurrection Fern.

tinguishing them at a glance, in winter, from other trees of similar habit and exterior when in the leafless state. As a general thing it avoids trees with a smooth or exfoliating bark. The reason for this is obvious, since it could not well secure a foothold on such uncertain supports. There are, however, many exceptions. The magnolia and bay have both very smooth bark, and the cedar exfoliates in long fibrous strips, yet it is not uncommon on all of these. I have never seen it on any kind of a

pine, nor on the hackberry (*Celtis occidentalis*). The bark of this tree is normally smooth like that of the beech, and though it usually becomes very rough and scabby on the trunks and lower branches of old trees, it is so hard and unretentive of moisture that it does not attract the colonies of lichens and mosses which establish themselves so freely on other species, and this fact probably has a more direct influence upon the polypodium's choice of a habitation than the character of the tree upon which it lodges. The fern is not a parasite and its roots never penetrate the living tissue of the host, but there seems to be a symbiotic relation between it and a certain soft, plush-like moss with which it is usually associated, the fern giving shade to the moss, while the latter serves as a reservoir to retain the moisture without which the rootstocks of its partner could not keep alive through periods of protracted drought.

Another peculiarity in regard to habitat is that our "little polypody" does not seek the seclusion of deep sequestered woods like most of the other ferns, but is most frequently found on the trunks and boughs of shade trees around dwellings and on the borders of roads and open woods. It is a familiar object on shade trees in all our southern towns, and instead of avoiding the presence of man seems to flourish best in his neighborhood. This is readily explained as an adaptation to its aerial habit—or possibly the habit may be an adaptation to the situation. If it had always confined itself to low-lying positions on logs and stumps, or on tree trunks in the deep shade of crowded forests where its spores could be carried only a short distance from the parent plant, it is easy to see that it could hardly have become, as it now is, one of the most widely distributed of American ferns.

Its range frequently overlaps that of the common polypody, especially among the Southern Appalachians and their foothills, where it occurs in patches on the face of rocky cliffs and the shelving sides of moss-covered bowlders, as well as on the roots and trunks of trees. The common polypody is of frequent occurrence on top of Lookout Mountain, and I have found occasional specimens of the "little Polly" in Walker Co., Ga., growing

in patches with moss, on the declivity below the great sandstone parapet. But wherever found it can always be readily distinguished from *P. vulgare* by the much smaller, coriaceous, oblong to triangular-lanceolate fronds, covered on the under surface with a thick grayish brown scurf. This scurfy coating plays an important part in connection with the drought resisting qualities of the plant. Viewed under a good hand lens it is seen to consist of a multitude of minute gray scales, each with a dark brown spot in the center. These scales cover the stomata or transpiration pores on the back of the frond, and when there is a dearth of moisture they retard evaporation from the surface, thus causing the frond to curl over on its face, exposing to the sun and air a scale armor that checks evaporation and thus enables the plant to preserve its vitality without water for an astonishing length of time. The agency of the scales in this important function was tested in a number of experiments by removing them* from one or more healthy fronds, leaving others on the same rootstock in their normal condition, and noting the relative time of wilting or recovery in each case. When fresh fronds were deprived of moisture, the denuded frond, other things being equal, always wilted more quickly than the others; but when conditions were reversed and dry specimens placed in water on a bright, clear day, the naked frond, on account of more rapid transpiration, recovered more slowly. In one experiment, where only one half of a vigorous, healthy frond was denuded, the two sides showed very little difference in warm, rainy weather, but when the atmosphere was dry the naked side was first to show signs of wilting, though the difference was not so marked as in the case of separate fronds.

To decide how long the polypodium can tolerate continuous drought without losing its vitality, a number of experiments were carried on at different times and places. In these, each of the specimens used was gathered with its mossy substratum intact, and kept in a dry place, where portions were separated from it at intervals and placed in water as long as any of them continued

* This can be done without injury to the epidermis, by gently scraping off the scales with a sharp knife while in the expanded state.

to show signs of life. There was considerable variation in the results obtained, but not more than might be expected on account of differences of climate in the various localities, the nature of the season, the health and vigor of the individual plants dealt with, etc. It would take too much time and space to go into the details of these experiments, but the results of one of them, which was continued for more than a year, are so interesting that a brief outline of it is given here.

On December 30, 1913, a large mat of polypodium (about 25 x 48 cm.) was gathered from a rocky hillside near Rome, Ga., where it was growing in a thick substratum of moss on one of the numerous outcroppings of shale and slate that form the ribs of the hill. The strata are tilted in such a way that the edge of the laminae is for the most part turned upward, and the mould which collects in the crevices offers a convenient foothold where the polypodium and the prostrate cactus (*Opuntia humifusa* Raf.) are found in close proximity to each other. The fern, with its substratum of moss, peeled off from the rock entire, like the skin of a banana, and was transferred to a flat stone in the basement of my house. The weather being warm and rainy, the fronds were all fully expanded and in fine condition, and it was not until January 13, 1914, that they began to show signs of withering. By January 31, the substratum had become dry and the fronds were all withered. On April 11, May 17, and June 15, specimens detached from the mat with their substratum, and exposed in the rain, revised in each case, within from 12 to 24 hours.

On July 30, the remainder of the mat was removed from the basement to the drier atmosphere upstairs and left on top of a bookcase in my study. October 30 (95 days after removal from the basement) another specimen was put out in a warm mist at 8 P.M., without watering the substratum, and by the same hour next morning it had revived sufficiently to show that it was still alive. The same specimen was then placed in water, and after 12 hours more, the fronds were all expanded but looked weak and sickly. (Note: The best specimens had all been used up,

and the fronds, in this case, were rather small and poor to start with.)

After this the specimens showed a gradual decline both in the quickness of their response when supplied with moisture, and in the relative number of fronds that completely regained their normal condition. On March 8, 1915, after 7 months and 6 days in my study and 7 months in the basement—a total of more than 14 months without water, the last remaining fragment of the mat was placed out of doors on a rainy day, but only 2 fronds expanded fully and regained their normal color. The specimen was then left on a rock under the drip of a gutter on the north side of my house, but it never revived further, and finally died.

THE VEGETATION OF A CINDER FIELD

By George T. Hastings

In the summer of 1916 the Palisade Interstate Park Commission completed the reclaiming of some three acres on the west shore of the Hudson River opposite Hastings. A wall of boulders taken from a rock slide immediately to the north was built across the front of a shallow bay and the space between this and the shore filled in. The filling was first of ashes and rubbish from one to six feet in depth, over this a layer of cinders six inches to a foot in thickness was placed and the whole leveled off. The ashes and cinders were brought up from New York in scows and distributed by small cars run on a track that was shifted as the filling progressed. The final level is about three feet above high tide level. This cinder field made as nearly a sterile soil and one that could retain as little moisture as could well be imagined. The water level in the soil was near the surface and most of the available water for young plants was due to capillarity. The filling was competed so late in 1916 that there was little opportunity for any plant life to develop, but during the summer of 1917 the area became well covered with plants, chiefly growing individually with bare cinders all around but in places crowded together. The following year the tract was covered

with a layer of clayey soil about three inches thick and but few of the plants of the year before reappeared. In 1917 ninety-six species of flowering plants were found. No fern of any kind and but one little patch of moss, the latter on the ashes of a picknicker's fire and not reaching maturity, was found. The flora was distinctively a weed one with little relation to the native flora on the adjacent hillside. Possibly the only plants to come from the immediate vicinity were a few seedlings of the small-toothed aspen, poison ivy, red-berried elder, and poke-berry, one vigorous shoot of *Paulownia* in the rock wall-probably brought from the rock slide at the north where two good-sized trees of the kind grow—and a few heart-leaved asters. Aside from these six species all the plants, including all the abundant ones, seemed to have been brought from a distance. Some twenty-four species have seeds definitely adapted to wind dispersal and three or four are sticktights, these may have been brought in by wind and animals, nearly all the remainder have small seeds with no special adaptation for dispersal over long distances and were apparently brought either with the cinders, on the ties of the railroad, or by the laborers. To the latter undoubtedly were due the fruits, apple, cherry, strawberry and raspberry. An interesting case was that of the Mexican tea, *Chenopodium ambrosioides*, that in several places grew in well-defined lines of two hundred feet or more along the course of the small railroad. Probably the seeds had adhered to the ties and been jarred off where the track had remained in one place for some time. In midsummer petunias and morning glories of several color varieties and sweet alyssum were abundant over the whole area, and in the fall numerous plants of *Kochia* added bits of brilliant color. Many of the individual plants, having no close neighbors to crowd them, attained very large size. Single plants of *Panicum capillare* and *P. proliferum* grew to three and four feet in height and covered from ten to sixteen square feet. Late in the summer some of the species were crowded by seedlings. Under one plant of *Euphorbia maculata* that made a mat three feet in diameter the cinders were thickly covered with tiny seedlings. On one square foot over two thousand were counted.

As would be expected of a weed flora few of the plants were native, only 29 per cent., and over half were annuals. None of the trees on the hillside near by were represented by seedlings though their seeds must have been scattered over the field in the fall. Black birches hung over the edge of the filled land but the only birch seedlings were of the grey birch, possibly from a few small trees some distance to the south along the base of the slope. Seeds of many of the shrubs and herbs of the slope of the Palisades must have been blown onto the area during the fall and early spring, but conditions on the cinders were not favorable to germination.

The orders best represented were the grasses, with 17 species and the composites, with 22—the two together representing more than 40 per cent. of the species—the grasses exceeding all other plants in the abundance of individuals. Indications were that many of the plants would survive for many seasons and give character to the flora until sufficient humus had accumulated to give foothold to other species. But the covering of the cinders the following year either buried the seeds too deeply or brought in so many sod-forming grasses as to crowd them out. A few still persist but are not the dominant forms. A patch of sunflowers has come since where the one plant grew in 1917 but the petunias, morning glory, *Kochia* and most of the others have not reappeared. The plants found were as follows:

Syntherisma fimbriata .... abundant over a small area.
Panicum capillare .... abundant over most of the area.
Panicum proliferum .... a few large clumps.
Echinochloa crus-galli .... common.
Chaetochloa viridis .... widespread.
Chaetochloa verticillata .... one or two plants.
Chaetochloa Italica .... a very few plants.
Muhlenbergia sylvatica .... a very few plants.
Phleum pratense .... a very few plants.
Aira caryophyllea .... a very few plants.
Avena sativa .... a few, possibly from horse feed—as horses were used in leveling the tract after filling.
Eleusine Indica .... few.
Eragrostis major .... very few.
Eragrostis capillaris .... few.

Poa annua .... few.
Puccinellia distans .... very few.
Lolium perenne .... very few on masses of good soil close to the inner edge of the fill.
Cyperus strigosus .... very few.
Commelina communis .... very few.
Populus tremuloides .... very few seedlings.
Betula populifolia .... few seedlings.
Rumex crispus .... two or three plants.
Rumex acetosella .... few.
Polygonum punctatum, leptostachyum very few.
Polygonum convolvulus .... few.
Polygonum pennsylvanicum .... few.
Polygonum aviculare .... two or three plants.
Kochia Scoparia .... common over whole area.
Chenopodium ambrosioides .... abundant.
Chenopodium album .... common.
Atriplex hastata .... very few.
Amaranthus retroflexus .... few.
Phytolacca decandra .... six or seven plants, all small.
Mollugo verticillata .... abundant.
Portulaca oleracea .... very few.
Koniga maritima .... abundant.
Lepidium apetalum .... abundant.
Brassica nigra .... very few.
Brassica oleracea .... very few.
Malus Malus .... few seedlings.
Fragaria sp. .... several seedlings.
Potentilla monspeliensis .... very few.
Rubus occidentalis .... one young plant.
Amygdalus Persica .... few seedlings.
Trifolium pratense .... very few.
Trifolium repens .... few.
Trifolium hybridum .... few.
Melilotus alba .... very few.
Medicago sativa .... one plant.
Medicago lupulina .... very few.
Oxalis stricta .... two plants.
Acalpha virginica .... abundant.
Euphorbia maculata .... abundant, and a great number of seedlings in the fall, 2,016 found on one square foot under a large plant.
Rhus radicans .... two or three seedlings.
Epilobium hirsutum .... very few.
Epilobium adenocaulon .... very few.
Chamaenerion angustifolium .... very few.
Onagra biennis .... few.
Ipomoea purpurea .... abundant over whole tract.

Verbena urticifolia	very few.
Verbena hastata	very few.
Petunia violacea	abundant.
Lycopersicon Lycopersicon	several.
Solanum nigrum	few.
Physalis pruinosa	very few.
Lycium vulgare	one plant.
Verbascum Thapsus	few.
Linaria Linaria	very few.
Paulownia tomentosa	one vigorous shoot at the edge of the water from a piece of branch wedged between rocks in the retaining wall.
Plantago Rugelli	very few.
Plantago lanceolata	very few.
Plantago major	very few.
Sambucus pubens	two plants.
Cucumis melo	one vigorous plant producing several melons.
Eupatorium purpureum	two or three plants, all small.
Eupatorium perfoliatum	one small plant.
Euthamia graminifolia	very few.
Aster cordifolius	very few.
Erigeron annuus	very few.
Leptilon canadensis	abundant, many with abnormalities of the flower clusters.
Anaphalis margaritacea	very few.
Gnaphalum obtusifolium	very few.
Helianthus annuus	one plant.
Bidens frondosa	few.
Bidens bipinnata	few.
Galinsoga parviflora	few.
Achillea Millefolium	few.
Chrysanthemum Leucanthemum	very few.
Erechtites hieracifolia	few.
Arctium minus	very few.
Carduus lanceolatus	one small plant.
Taraxacum Taraxacum	few.
Lactuca virosa	very few.
Sonchus asper	very few.
Ambrosia artemisiaefolia	very few.
Xanthium echinatum	very few.

SHORTER NOTES

"Disappearing Wild Flowers."—In the *Journal of Botany* for May, under the above heading, it is stated that the London *Times* has published several letters calling attention to the destruction of our wild flowers and stating that "it is time that additional steps were taken to protect wild plants and flowers." In Devonshire, the home of the primroses, they are rapidly disappearing and there are very few of them left within a circle of twenty-five miles around London. Ferns and orchids also have been extirpated. "Even in areas such as public parks, where special prohibitions are in force, there has been increased defiance of them since the War, mainly owing to the diminution of effective supervision." This has been the case in the parks of New York City also and it emphasizes the danger to any flower that has become popular or is specially desirable.

E. G. Britton

New York Botanical Garden

New Specific Name.—I find that the specific name *oligocaenica* proposed by me* for a new species of *Inga* from the Culebra formation of the Canal Zone is antedated by *Inga oligocaenica* described by Engelhardt† in 1898 for a species from the Oligocene of the Mittelgebirge in Bohemia. The Panama Oligocene species may be called *Inga* **culebrana** in allusion to both the horizon and the locality.

Edward W. Berry

A New Form of Stanleya.—In the extreme western part of Kansas there is a *Stanleya* which agrees with none of those described. It is nearest to *S. glauca* Rydberg, but the leaves are much broader and the stem is not bluish green. Very possibly it should be considered a distinct species, but at present we do not know its exact status, and it seems better to regard it as a race or subspecies of *S. glauca*.

* Berry, E. W., Bull. U. S. Natl. Mus. **103**: 32. *pl. 16. f. 2.* 1918.

† Engelhardt, H., Tertiaerflora von Berand, 61. *pl. 4. f. 12.* 1898.

Stanleya glauca latifolia

Tall, robust, with pale green somewhat ribbed but not angular stems; cauline leaves light green, thick, glaucous, with a bloom, entirely glabrous, broad-lanceolate, entire, with thick well developed narrowly winged petioles, which on large leaves are not so long as half the width (45 mm.) of blade. Flowers in the usual racemes, bright canary-yellow, becoming orange in fading; sepals about 12 mm. long, narrow, parallel-sided; petals about 11 mm long, of which 4 mm. is the lanceolate blade; claw hairy on inner face; filaments perfectly glabrous; pods long-stipitate, arcuate.

Edith, Kansas, May, 1920 (*Rowena Kesler*).

Type in U. S. National Museum; part of same in New York Botanical Garden.

T. D. A. Cockerell

REVIEWS

Henry and Flood's The Douglas Firs*

The Douglas spruce has always been regarded as a variable species and many have wondered if not more than one species have been included under that name. It is therefore very interesting to know that this problem has been taken up lately and been attacked from more than one standpoint, the gross anatomy of the branches, leaves and fruit, but a comparison has also been made as to the difference in odor, minute anatomy of the leaves and chemical composition of the oil distilled from the leaves.

The authors admit three species and one variety native to North America and four species native to China and Japan. The North American species, which interest us most, are distinguished as follows:

"1. *P. Douglasii* Carrièrre. Pacific coast region of North America. Branchlets pubescent. Leaves thin, flat beneath, with pineapple odor. Cones 3 to 4 inches long, with straight erect bracts.

"var. *caesia* Schwerin. Northern Rocky Mountains. This differs from the type in the glabrous branchlets, the thicker needles and smaller cones, 2½ inches long.

* Augustine Henry and Margaret G. Flood, Proc. Royal Irish Acad. **35**: Sect. B: 67–92. *pl. 12–14.* My 1920.

"2. *P. glauca* Mayr. Rocky Mountains, Colorado to Mexico. Branchlets variable in pubescence, often glaucous. Leaves thick, rounded beneath, with strong turpentine odor. Cones 2 to 3 inches long, with reflexed bracts.

"3. *P. macrocarpa* Mayr. Southern California. Branchlets variable in pubescence. Leaves thin, flat beneath, ending in a cartilaginous point. Cones very large, 3½ to 7 inches long, with erect straight bracts."

Of these *P. macrocarpa* has generally been admitted as a good species. The Pacific coast tree, *P. Douglasii* or *P. mucronata* proper, as far as it is represented in the herbarium of the New York Botanical Garden, holds its characters very well. It may be added that the bracts are comparatively longer and narrower than in the Rocky Mountain species so that the lateral lobes extend to or beyond the cone scales. All our specimens from Eastern British Columbia, northern Idaho, northwestern Montana and southeastern Washington agree with var. *caesia,* but those of the Blue Mountain region of Oregon are variable, the cones and their bracts mostly as in the variety, but the cones in some are somewhat larger and the twigs somewhat pubescent in others. Our specimens from southern Wyoming, Colorado, Utah, Arizona, New Mexico and northern Mexico agree with *P. glauca,* the branches being mostly more or less pubescent, though in a few practically glabrous. In three specimens from New Mexico and Arizona, the bracts are not reflexed, but unfortunately all these are rather young, and the bracts may not become reflexed except in age. In the Yellowstone Park and northern Wyoming, the var. *caesia* and *P. glauca* seem to be mixed and intergrading. To the reviewer it seems as if the West Coast tree, *P. mucronata* were rather distinct, but that the var. *caesia* were more related to *P. glauca* than to *P. mucronata.* The authors do not mention anything concerning the odor of the leaves of the var. *caesia* nor of the composition of its oil. To the reviewer it seems more logical to regard even this as a distinct species or else regard all three as geographical varieties of one. A fourth species or variety may be represented by the specimens

collected in south central Mexico, at Moran, Mexico, by Hartweg and at Real del Monte, Hidalgo, by Ehrenberg.

P. A. Rydberg

Pellett's American Honey Plants*

Coming at a time when the earth's entire population is experiencing considerable anxiety over the sugar famine and our attention is naturally directed to logical substitutes for sweets and their source, this book on American Honey Plants has a peculiar and timely interest.

The 800,000 beekeepers of the United States are fortunate in having as one of their number a man possessing the combination of a thorough knowledge of apiculture and of nectar-producing and pollen-producing plants. This happy combination has made possible a convenient and exhaustive reference book. The approximately 900 plants in many genera, described as of some value because of nectar or pollen production are arranged alphabetically by common names with numerous cross references, Latin names accompanying the vernacular.

Frank Stoll

PROCEEDINGS OF THE CLUB

March 9, 1920

The first meeting of the Club for March was held at the American Museum of Natural History.

President Richards presided. There were 18 persons present.

No business was transacted.

Dr. W. A. Setchell of the University of California gave an illustrated paper on "Aboriginal Tobaccos."

The various species of *Nicotiana* used by the tribes of American Indians were discussed. Different methods of smoking were and still are in use, but in all cases the leaves of the plant is the portion used. Evidence suggests the use of as many as fourteen

* Pellett, Frank C., American Honey Plants, together with those which are of special value to the beekeeper as sources of pollen. Pp. 1–297 + figs. 1–155. Published by American Bee Journal, Hamilton, Ill., 1920.

species, tobacco-culture having extended from Washington and southern Canada to Chile. At present 8 species appear to be used by Indians:

1. *Nicotiana Tabacum.* This, the one species now commercially cultivated, was originally grown throughout eastern South America and northward to Mexico. It has formed a large number of varieties.

2. *Nicotiana rustica.* This species was cultivated extensively throughout North America east of the Great Plains and western highlands. It was early carried to the Old World, and is still cultivated there in the Levant and Persia. The species, like some others of the genus, is unknown wild, but must be of American origin.

3. *Nicotiana Bigelovii.* Probably used by Indians in California.

4. *Nicotiana multivalvis.* Used by Indians in the region of the Columbia River. A cultivated and quite unusual species, as is shown by the capsule being many-celled instead of two-celled.

5. *Nicotiana quadrivalvis.* A relative of the Pacific coast *Bigelovii* and *multivalvis,* but occurring east of the Rockies along the valley of the upper Missouri. Also an unusual species with a several-celled capsule. Doubtless of Pacific origin and carried eastward along old routes of Indian trade.

6. *Nicotiana attenuata.* The species used by the Indians of the Great Plains from Saskatchewan to Texas.

7. *Nicotiana Clevelandii.* A species of southern California, probably used by the Indians.

8. *Nicotiana trigonophylla.* A species occurring from western Texas to southern California, and used probably at least by the Apache Indians.

Beside discussing the relationship and distribution of these species, the speaker gave many historical details, touching upon Indian customs. He was emphatic in stating that, both from cultural as from purely botanical premises, the genus *Nicotiana,* excepting two unique endemic species of Australia, is wholly of American origin. The wide extent of its use, the number of species domesticated, and the occurrence of some which appear

to be products of cultivation, all point to the antiquity of its culture by the Amerinds.

FRANCIS W. PENNELL,
Secretary

NEWS ITEMS

Dr. Frank Shipley Collins, of North Eastham, Mass., for many years a resident of Malden, died suddenly on May 25, at New Haven, Connecticut, in the seventy-third year of his age. Mr. Collins was one of the best-known writers on the American algae, having begun his special studies of this group of plants in early manhood, as a diversion from the cares of business, and continuing them as an avocation with remarkable zeal and success. Perhaps the first of his contributions to the literature of the algae was a note published in the *Bulletin of the Torrey Botanical Club* in 1880. His two most important works were "The Green Algae of North America," published in 1909, with supplements in 1912 and 1918, and, with Dr. A. B. Hervey, "The Algae of Bermuda," published in 1917. At the time of his death he had nearly ready for publication a paper on the algae of the Philippine Islands and had projected also a manual of the marine algae of the northeastern coast of the United States. In association with Professor William A. Setchell and with the late Isaac Holden he issued the "Phycotheca Boreali-Americana," a collection of dried specimens of the algae of North America, which had reached a total of 2,400 numbers, a total only slightly exceeded by Rabenhorst's Die Algen Europa's, the only other series of algae exsiccatae that ever approached the Phycotheca in magnitude. The passing of Farlow and of Collins leaves a wide gap in the never too crowded ranks of the American students of the algae. [M. A. H.]

Professor Raymond J. Pool was engaged for the growing season upon a piece of industrial research in Salt Lake City in connection with certain litigation which is of long standing and in which a number of smelting companies, as well as all of the inhabitants, are interested. A commission composed of chemists, chemical engineers and botanists were at work under the direction of a Commissioner appointed by the Federal Court.

TORREYA

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PELORIA IN VIOLA PRIMULAEFOLIA LINN.

By L. R. Detjen

Peloria in Viola is not a new phenomenon. It was recorded as early as 1775 when Leers* described his observations on plants of *Viola odorata*. A few years later M. Colladon-Martin† recorded a similar observation in *Viola hirta*. Both of these violet species happen to be European forms. Apparently no American species has ever been recorded producing this singular phenomenon, notwithstanding the existing great wealth of varieties and diversity of environmental conditions on the American continent.

Peloric flowers in *Viola* have been described as being of two forms, viz., those that are complete in their transformation and those that are incomplete, but as no mention was made of any other teratological phenomena being correlated with the change in the form of the flowers, we assume that those specimens that were reported represent merely cases of simple peloria.

An unusually interesting case of peloria was discovered in a *Viola primulaefolia* Linn. plant in 1912 which not only produced flowers with all of the various forms of peloria represented but in addition and correlated with this phenomenon appeared a radical change in the type of the flowers, viz., one of a general reduction and a tendency toward a numerical uniformity in the constituent parts of all of the floral whorls. The normal violet flower, as is well known, consists essentially of five sepals, five petals, a five stamen androecium and a three carpellary pistil, while the flower of this newly discovered plant in its extreme peloric form consists of a four-parted calyx, a four-

* Flor. herborn., p. 145.

† D. C. Organ. veget., t. 1, p. 519, pl. XLV.

[No. 5, Vol. 20 of Torreya, comprising pp. 91–106, was issued 12 November, 1920.]

parted corolla, a four-parted androecium, and a four carpellary pistil. Thus the typical form of the violet flower has been changed to one that is not only perfectly regular but also uniform in all of its parts.

FIG. 1. A plant of *Viola primulaefolia* Linn. bearing the modified flowers.

The original plant bearing these unique flowers was discovered in May, 1912, on the bank of Rocky Branch at West Raleigh, North Carolina, and it proved to be the only plant, among hundreds of others of the same species, that exhibited this peculiarity. Most of the flowers were peloric in form but the majority of them were of the incomplete type. The evidence then at hand suggested that a new regular violet flower, one

composed of four sepals, four petals, four stamens and four carpels, was in the process of formation. Such flowers have later been obtained and a truly new type of violet realized.

A detailed description of the normal violet flower together with a brief description of the complete and incomplete peloric forms and their correlation with other characters will now be given.

Description of the Normal Violet Flower

The normal violet flower is too well known to warrant a detailed description. However, for the sake of comparison with those of the peloric types, the essential characters will be briefly mentioned.

The calyx is composed of five sepals, three of which are plainly auricled. The corolla is composed of one saccate or spur bearing petal, which normally is situated at the base of the flower, and four others which are non-saccate. In addition to the saccate character, this petal is easily distinguished by its long and distinct, dark purplish inner striations. The androecium is composed of five stamens each of which bears a pair of anther-sacs. Only two stamens of the set of five bear a stamen-appendage. They are located one on each side of the saccate petal and the two appendages are enclosed in the one sac. The pistil is composed of three carpels with as many placentae to which the ovules are attached. The style has a decided dorso-ventral curvature immediately above the ovary and its gradual upward dilation ultimately forms the stigma. The pore-tube slants at a decidedly sharp angle with the longitudinal axis of the style.

These are the characters of the normal flower of *Viola primulaefolia* Linn. and are enumerated at this time merely for the sake of a contrast with similar ones found in the various peloric forms.

Description of the Complete Peloric Flowers and their Correlations

In view of the fact that two wonderful changes are taking place in the flowers of this violet plant, it might be well to repeat

that the phenomenon of peloria in *Viola primulaefolia* as described in this paper seems to involve not only a transformation of the irregular or unsymmetrical flower to one that is regular or symmetrical with respect to the transverse diameter of the

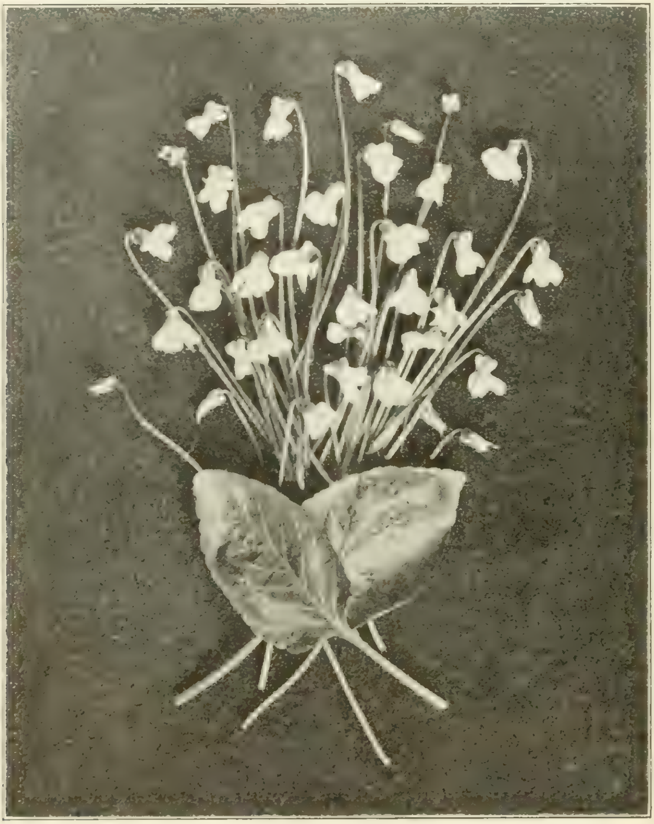

FIG. 2. A handful of violet flowers gathered from the new strain of *Viola primulaefolia*. Notice the variations in the numbers and positions of the saccate petals.

peduncle but also a reduction in the number of component parts of all of the floral envelopes, except the pistil, in which case the number is definitely increased. Therefore, the peloric flowers which are complete in their transformation including the changes resulting in the uniformity in numbers of the constituent parts of the floral whorls, may be described thus:

The calyx is composed of four equal sepals all of which are plainly auricled. The corolla is similarly composed of four equal petals all of which are saccate and true spur-petals in every essential including the interior striations. The androecium is composed of four stamens, each of which bears a pair of anther-sacs and one appendage. It is also noteworthy to mention that of the four sacs of the corolla, one encloses two stamen-appendages, or one from each of the two adjacent stamens, two enclose one appendage each and one apparently does not enclose any. The carpels are four in number with four equally developed placentae. The style immediately above the ovary is practically straight and a distinct dilated stigma with two lobes is formed at its distal extremity. The beak or pore-tube is situated in the center of the stigma and its longitudinal axis is in the same plane as that of the style. The opening of the pore-tube, instead of being circular in outline, is represented by what might be called an oblong orifice whose greater diameter lies at right-angles to that of the stigmatic lobes.

While this fully developed type of flower represents the extreme of variation, it is represented, in this case at least, in but a small percentage of the flowers.

Description of Intermediate Types of Flowers

The intermediate flower types are quite variable and are represented by an infinite number of forms with respect to the number and arrangement of their constituent parts. They apparently form a complete series from that of the normal flower to that of the extreme peloric type. In the spring of 1920 a total of 573 flowers were picked quite at random and a study of these gave the following ratios: no saccate petals—0 flowers, one saccate petal—203 flowers, two saccate petals—157 flowers, three saccate petals—128 flowers, four saccate petals—84 flowers, and five saccate petals—1 flower. A number of these flowers have been dissected and critically studied and as a result of the analyses it becomes possible to make the following deductions.

1. Each of the floral whorls may exhibit modifications inde-

pendent to some extent of the other whorls. For instance, we find flowers with four sepals, five petals, five stamens and three carpels; four sepals, four petals, five stamens and four carpels; four sepals, five petals, five stamens and four carpels; or such an arrangement as, five sepals, five petals, three stamens, and three carpels, and so on.

2. The constituent parts of the floral whorls may be modified independently of one another. Thus we find three or four sepals plainly auricled whenever five constitute the calyx, but when four or a less number of sepals constitute the calyx all of them are so auricled. One case was studied where five sepals were present and all of them were plainly auricled, another case where only three sepals constituted the calyx and all of them were so auricled.

In the corolla we find either one, two, three, four or even five petals saccate whenever five constitute the whorl. When only four petals are present all are saccate. Frequently petals are found that might be termed intermediate between the non-saccate and those that are plainly saccate. Normally the saccate petal in *Viola* is situated at the base of the flower but in this new type it may be found in the place of any one of the five petals, that is, on any one side of the flower. Whenever two or more saccate petals are present they may be found in any of the five different positions. Four saccate petals are usually found located opposite one another, thus forming a perfect square.

Among the stamens we find two, three or four that are appendaged whenever five constitute the androecium. Whenever four or a less number are present all of them usually are appendaged. It might be stated in this connection that the spur of generally one, sometimes two, saccate petals encloses one appendage of each of the two adjacent stamens. Again, all of the stamens may bear twin anther-sacs or, for instance, whenever four stamens constitute the androecium, one or two individuals may bear triple anther-sacs. A case of this kind was observed where two of the four stamens had three anther-sacs each and were situated on opposite sides of the androecium. Other cases were observed where only one of a set of four stamens had

the triple anther-sacs and two cases where but three stamens constituted the androecium. In these latter cases one of the three stamens bore the normal twin and the other two the triple anther-sacs. Again, two, three or four stamens may bear single

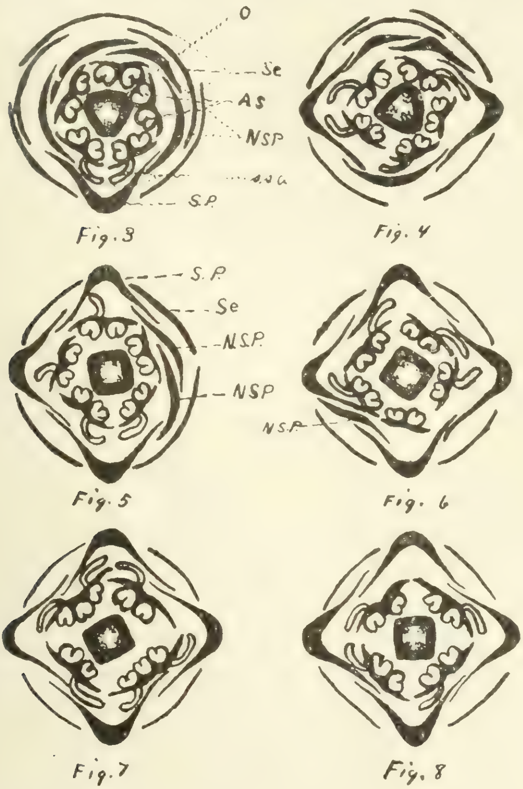

FIG. 3–9 incl. represent sketches of cross-sections of some of the modified flowers. Se., sepals; S. P., saccate petals; N. S. P., non-saccate petals; Tw. A. S. twin anther-sac stamen; Tr. A. S., triple anther-sac stamen; A. S., anther-sacs; s. s. a., single stamen appendage; t. s. a., twin stamen appendages; O., ovary with its placentae and ovules.

appendages or as in the case of the stamens that bear the triple anther-sacs, one or more may bear twin appendages.

The ovary may be composed of three or four carpels. The fourth carpel is often found in various stages of development.

3. A certain amount of correlation or interdependence seem-

ingly exists between the character and position of some of the constituent parts of one floral whorl and those of other whorls within the same flower. For instance, the saccate petal usually is correlated with an appendage affixed to one of the adjacent stamens; and the size of the sac seems correlated with the size and development of the enclosed appendages. Apparently an exception to this rule is found within the extreme peloric flowers where one saccate petal is regularly seemingly unaccompanied by the usually inclosed stamen appendage.

Another correlation that might be mentioned is one existing between the number of stamen appendages and the type of stamen; for instance, the twin appendages are always associated with the triple anther-sac stamen but these in turn need not always bear the twin appendages.

Inheritance of Peloria and the Tendency toward Numerical Uniformity in the Floral Whorls in Viola primulaefolia

As soon as the plant bearing peloric flowers was discovered it was transplanted to a more suitable field where it continued to grow and develop seed. Some of the seeds were saved and planted in a flat where they germinated early in 1913. Sixteen plants were secured and later transplanted to an open field where they bloomed the following year. All of these plants produced flowers similar to those of the parent plant. The sixteen plants soon began to multiply by means of stolons and soon a patch or a solid mat of plants was formed. All of the plants originating from stolons also produced flowers quite similar to those of the parent plants. From time to time the matted patch was thinned of its superfluous and older plants and still the newest plants, even after a lapse of seven seasons, continued to produce flowers like those of the original plants.

Effect of Environment on Peloria and the Tendency toward Numerical Uniformity in the Floral Whorls

Plants of this unique strain have been grown in a number of different places and under a variety of conditions for the purpose

of ascertaining what effect environment might have on the form of the flowers: Individual plants, in early spring and before much growth had taken place, were potted in good garden soil and grown indoors like ordinary house plants, others were bedded in similar soil supplied with a generous amount of fertil-

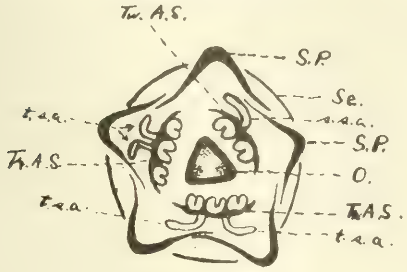

Fig. 9

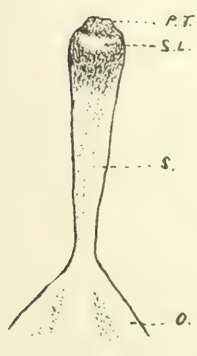

Fig. 10

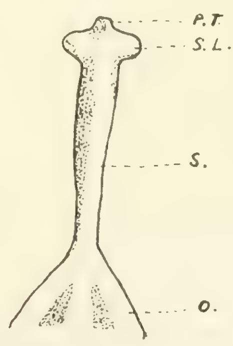

Fig. 11.

FIG. 10 represents the style and stigma from a complete peloric flower, side view. P. T., pore-tube; S. L., stigmatic lobe; S., style; O., ovary. Fig. 11 represents the same style and stigma from a front view.

izing constituents and grown under greenhouse conditions and still others were grown in the muck soil of a damp or swampy area in the open field. The results in all cases were alike, all of the plants without exception produced the previously described peculiar flowers.

A Few General Remarks

The outstanding features of this new strain of *Viola* are:

1. It produces variable flowers which exemplify the connecting link between a 5-merous and a 4-merous flower.

2. It embodies the phenomenon of peloria which changes the flower from an unsymmetrical one to one that is perfectly symmetrical.

3. With respect to (1) and (2) it remains uniform under great differences of environment.

4. It apparently breeds true to type both vegetatively and sexually.

5. Because of (4) it might be truly termed a mutation.

Other generations of this interesting strain of violets will be grown and reported on as time will permit but since the seeds are borne in capsules of cleistogamous flowers they might be considered the result of self-fertilization and therefore succeeding generations might not differ materially from the first unless the strain throws other mutations.

AN EXCURSION TO MOUNTAIN LAKE, VIRGINIA

By William Alphonso Murrill

Our party of six left Blacksburg, Virginia, for Mountain Lake at seven o'clock on the morning of July 22, 1920, prepared to spend the day. Clear weather had succeeded a season of rain and the hay-makers were busy in the fields along the road as we passed, while the oat crop stood ready for harvesting. Nature had not been stingy in any particular; everything planted in gardens and fields was growing and yielding most bountifully, while the last raspberries and dewberries and the first of the blackberries indicated an unusual abundance of wild food.

The first range we climbed and crossed was Brush Mountain, whose southern flank was covered with stunted pitch pine, bracken fern, sweet fern, and a wealth of *Coreopsis seniifolia*, with attractive yellow flowers and leaves arranged in whorls of sixes. From Brush Mountain to Gap Mountain was only a few minutes' ride, across a narrow stretch of sterile land very

appropriately named Poverty Valley. By the roadside in the "Gap" was a spring of cool water and the hay-scented fern, *Dicksonia*, grew there in abundance. Nestled in a deep cove beyond Gap Mountain was the village of Newport, eight miles from Blacksburg and just halfway to Mountain Lake. After negotiating the steep hill to the north of Newport and crossing Sinking Creek, we were at the base of Salt Pond Mountain, with six miles of tortuous and rather rough climbing ahead of us. Our attention, however, became more and more directed to the increasing magnificence of the view and the successive changes in the character of the vegetation as we climbed from an elevation of 1,800 to one of 4,500 feet above the sea.

Along the road near the foot of the mountain, the common milkweed and the butterfly weed, with orange-colored flowers, bloomed profusely, interspersed with the blue, star-shaped flowers of the cultivated chicory, which has become very common in many parts of Virginia. In one of the hollows, a large clump of pale jewel-weed, *Impatiens pallida*, was seen in full flower. The most abundant weed at the lower elevations was *Actinomeris squarrosa*, often called "river-weed," which was easily recognized without flowers by its square, winged stem. As we approached the upper part of the mountain, after rounding the long curve that brought the valley of New River into view, the scarlet flowers of the fire pink, *Silene virginica*, gleamed from the rocky banks and large groves of chestnut trees in full flower indicated a bountiful crop of nuts, unaffected as yet by the canker.

Near the lake, we halted at the famous cold spring for a drink and then went on to the hotel, which is situated at the southern end of the lake, 4,000 feet above sea-level, with Bald Knob rising behind it 500 feet more. Sunset Hill lies to the westward, —famous for a large deposit of marine Devonian fossils and for its fine view. A thicket of common hazelnut bushes crowned this little eminence, with gooseberry bushes growing near. The beaked hazelnut, *Corylus rostrata*, is quite common on the northern flank of Bald Knob some distance above the hotel. The blueberry fruits were just beginning to ripen at this elevation, while the shin-leaf, *Pyrola americana*, was in flower and

the hay-scented fern, *Dicksonia punctilobula*, which is very abundant at Mountain Lake, was in full foliage with numerous young sporangia.

The margin of the lake was fringed with a dense thicket of *Rhododendron maximum* in full flower, and in the moist leaf-mold beneath the rhododendrons a number of brilliantly colored mushrooms grew. Near the spring on the right was a bed of *Oxalis Acetosella*, while nearby were several large trees of *Ilex monticola* and *Betula alleghaniensis*, the latter bearing black, aborted forms of *Pyropolyporus igniarius* similar to those found commonly on yellow birch in New England. I looked for *Parnassia* but could not find it; then my attention was attracted to a pretty shadbush loaded with fruits, some of which were ripe.

At the lower end of the lake, a species of skullcap,—either *Scutellaria nervosa* or *S. pilosa*,—was abundant, covered with small blue flowers. Nearby, in the leaf-mold, I found an insect-eating fungus, *Cordyceps militaris*, growing on the pupa of the same insect which I found so commonly attacked by it in the mountains of western North Carolina. A beautiful specimen of the mountain silver-spot butterfly, *Argynnis cybele*, hovered near; but *A. diana* was not seen during the entire journey, although the males should have been on the wing by that time.

Field notes were made on many of the flowering plants seen, as well as on the fungi (which have been listed in *Mycologia*). In addition to those already mentioned, the following might be of interest:

Herbaceous Plants

Arisaema triphyllum, just passing out of flower; *Clintonia umbellata*, in leaf; *Trillium grandiflorum*, in leaf; *Unifolium canadense*, in fruit; *Apocynum androsaemifolium*, in flower; *Baptisia tinctoria*, so much used to keep flies from horses' heads, in flower; *Collinsonia canadensis*, in leaf; *Dalibarda repens*, so often mistaken for an evergreen violet, in leaf; *Dianthus Armeria*, in flower; *Echium vulgare*, very common at lower elevations, in flower; *Epigaea repens*, in leaf; *Galax aphylla*, more common on Brush Mountain, in fruit; *Gaultheria procumbens*, in flower; *Hydatica petiolaris*, a rare saxifrage abundant every season among the rocks on top of Bald Knob, in flower; *Lysimachia quadrifolia*, in flower; *Monarda fistulosa*, in flower; *Monotropa uniflora*, in flower and fruit; *Prunella vulgaris*, in flower; *Saponaria officinalis*, in flower; *Therofon aconitifolium*, on Bald Knob, in flower; and *Verbascum Thapsus*, in flower.

SHRUBS

Azalea nudiflora, in leaf; *Ceanothus americanus*, very abundant on Brush Mountain, in flower; *Comptonia peregrina*, also more common on Brush Mountain, in leaf; *Gaylussacia baccata*, in fruit; *Kalmia latifolia*, in fruit, *Oxycoccus erythrocarpus*, on Bald Knob; *Rosa virginiana*, in flower; *Rubus odoratus*, in flower; *Sambucus canadensis*, near the Cascade, in fruit; and *Viburnum alnifolium*, in fruit.

TREES

Acer pennsylvanicum, *A. rubrum*, *A. saccharinum*, and *A. saccharum; Alnus rugosa; Carpinus caroliniana; Celtis occidentalis; Cynxoylon floridum; Fagus grandifolia; Fraxinus americana; Hamamelis virginiana; Hicoria glabra* and *H. ovata; Juglans cinerea* and *J. nigra; Juniperinus virginiana; Liriodendron Tulipifera; Magnolia acuminata; Nyssa sylvatica; Oxydendrum arboreum*, in flower; *Pinus rigida* and *P. Strobus; Prunus americana; Quercus alba, Q. coccinea, Q. palustris, Q. Prinus, Q. rubra*, and *Q. velutina; Robinia Pseudo-Acacia*, badly attacked by *Fulvifomes Robiniae; Sassafras Sassafras; Sorbus americana*, on Bald Knob; *Tilia americana*, *in* flower; *Tsuga canadensis*; and *Ulmus americana*.

As may be judged from the above account, the flora of Mountain Lake is similar to that described in TORREYA a few years ago for Apple Orchard Mountain in the Blue Ridge, but the Carolina rhododendron and a few other striking elements are absent.

W. A. MURRILL

NOTES ON SCLEROPOA

By J. C. NELSON

At the end of a rambling series of notes on "Some Oregon Exotics" in the American Botanist for November, 1918 (**24**: 129), attention was called to the discovery of *Scleropoa rigida* (L.) Griseb. at Salem, Oregon in May, 1917. Since the plants found at that time were growing precariously in the crevices of an old brick building in the business district, and were looked upon with extreme disfavor by the street-commissioner, it did not seem prudent to regard the species as a permanent addition to our flora. Since that time the building has been changed from a junk-shop to an automobile-station, and an attempt has been made to eradicate the weeds by which it was originally surrounded and restore the neglected street-parking; but in spite of all these "improvements" the grass has stubbornly reappeared each season, and this year (1920) has established itself profusely

in the parking adjacent to the building. Since it matures abundant seed very early, before the dry season sets in, it seems not unreasonable to suppose that we may begin to number it among our permanent grass-population.

As this is undoubtedly the first record of *Scleropoa* in Oregon, I have made some effort to determine to what extent it has appeared elsewhere in the United States. An examination of our three largest herbaria—the National, the Gray, and the New York Botanical Garden, shows a representation outside of Oregon as follows:

ALABAMA

Fort Morgan, S. M. Tracy, Apr. 27, 1901 (Nat.)

Fort Morgan, S. M. Tracy, Apr. 27, 1901 (Gray)

Fort Morgan, collector not stated, (N.Y.)

Mobile, "Ballast-grounds," Chas. Mohr, June 28, 1885 (Nat.)

Mobile, "Ballast-grounds," Chas. Mohr, No. 5 (Nat.)

FLORIDA

Apalachicola, "Wharves," Chapman (Nat.)

Apalachicola, "Streets," Geo. Thurber (Gray)

MASSACHUSETTS

Boston, C. E. Perkins, July 17, 1878 (Nat.)

SOUTH DAKOTA

Brookings, Matt. Fowlds, July, 1917 (Nat.)

It will be observed that most of these labels are rather imperfectly provided with data as to date and habitat, but the Boston specimen would appear to be the earliest collection, and with the exception of the Brookings plant, all the recorded specimens are from localities on or very near the coast, clearly indicating a foreign origin. Since the South Dakota station is in such marked contrast to the others, I have asked Professor Fowlds, in charge of the Seed Laboratory at the South Dakota Agricultural Experiment Station, to give me the circumstances under which the grass was first collected. He writes:

"In 1915 a grass-garden was established at this station. Many of the grass-samples for this purpose were secured for us by a seedhouse. Some of these samples came from various points in Europe. The *Scleropoa rigida* occurred as an impurity in one of these samples. We have no means of knowing where the sample originated. Only one plant of this grass appeared, but the seed was collected and the grass propagated for a year or two. This grass can be propagated only with difficulty and never gave evidence of persisting on its own account. Several specimens of this plant have been preserved in our herbarium."

It is evident from the above that the Brookings plant never rose above the status of a waif, and could not be regarded as a part of the local flora. The station at Salem seems therefore to represent the farthest point inland at which the grass has established itself in the United States. How it came here remains unexplained, as there does not appear to have been any storage of foreign goods in the building where it was first found.

The European native range of the grass seems to be limited to the Mediterranean region from southern France to Montenegro, with an outlying area in Belgium; but it has spread widely through southern and central Europe as a naturalized plant, according to Hackel even reaching England.

In general habit the grass attracts instant notice by its very rigid open panicle, which suggests that of *Festuca elatior* on a small scale, but with a stiff, unyielding effect which gives a certain resemblance to the fertile frond of various dimorphic ferns (*e.g.*, *Cryptogramma acrostichoides*). In general it would be taken for a *Festuca* by one encountering it for the first time; and as a matter of fact, the genus stands taxonomically very close to *Festuca*, from which it appears to differ chiefly in its punctiform hilum. Its exact relationship has been a matter of very various interpretation. Linnaeus, who first described it (Cent. Pl. **1**: 5. 1755) placed it in *Poa*. There is no evidence that he had a specimen before him, and his description appears to be based on a plate by Vaillant. Beauvois (Agrost. 167, 175. 1812) transferred the species to *Megastachya*, a genus no longer maintained; Link (Enum. **1**: 90. 1821) placed it in *Sclerochloa*,

now regarded as a monotypic genus consisting of *S. dura* Beauv.; Smith (Engl. Fl. **1**: 119. 1824) regarded it as a *Glyceria;* and Kunth (Rev. Gram. **1**: 129. 1829) very tardily recognized the relationship to *Festuca* by placing it in that genus.

The genus *Scleropoa* was finally established by Grisebach (Spic. Fl. Rumel. **2**: 431. 1845) and was made to include but the one species *S. rigida*. Since that time various concepts of the genus have prevailed. Parlatore in 1848 recognized seven Italian species. Boissier in 1884 recognized seven species in his Flora Orientalis. Twelve binomials are given under *Scleropoa* in the Index Kewensis. Hackel (in Engler & Prantl, Nat. Pflanzenfam. **2**: 2, 75. 1887) states that there are "2 Arten," and names *S. rigida*. What he regards as the second one cannot be conjectured with certainty, although of the various species that have been proposed *S. Hemipoa* (Delile) Parl. (Fl. Ital. **1**: 472. 1848), a native of Sicily, would seem to have perhaps the best claim to validity.

I am under obligation to Dr. J. H. Barnhart for compiling and verifying the bibliography of *Scleropoa*, and to Prof. A. S. Hitchcock, Dr. J. K. Small, Mr. J. F. Macbride and Prof. Matthew Fowlds for their information regarding herbarium specimens. Duplicates of my own collection have been deposited in each of the three large herbaria named above.

SHORTER NOTES

A New Oregon Eucephalus. **Eucephalus vialis,** sp. nov.— Stems slender, light green, about 12 dm. high, furnished with a glandular pubescence; leaves thin ovate-lanceolate, sessil or nearly so: dark green above, dull beneath, but not glaucous, slightly puberulent, the upper ones in the panicle especially so, and provided with stiff hairs on the margins, which are subentire; 2–11 cm. long, 5 mm. 3 cm. wide; the lower minute, usually obtuse, the upper acuminate; inflorescence of numerous heads in a panicle, the branches of the panicle, glandular, beset with spreading hirsute pubescence; heads rather small and narrow, ordinarily 10 mm. high, but often no more than 5 mm.; bracts of the involucre in

3–4 series, usually pale and chartaceous, rarely slightly herbaceous, the lower somewhat glandular; rays none; the dull bristles of the pappus unequal and longer than the yellow tubular disk flowers; akenes oblong, flattened, and villous with somewhat appressed hairs; the style branches linear-lanceolate.

Rocky hillsides, Eugene, Oregon. *Bradshaw* no. 1944 (the type); no. 1885; and no. 1914 (in the U. S. National Herbarium). The duplicate of the type is to be placed there also. *Cusick* (as E. Engelmannii), rocky hillsides, Willamette Valley.

This species first came to my attention three years ago, when I thought it was an *Aster*. Since them I have come to the conclusion that it belongs to the genus, *Eucephalus* and that it is very closely related to *E. Engelmanni*. It seems to be nearer to that species than to any of the others. The differences, however, between it and that species are very evident, even from a casual study. The general appearance is very similar. The stems and leaves are of the same color; but the stems of *E. Englemannii* are much more glabrous, and the leaves somewhat broader. The heads of *E. vialis* are smaller and more narrow than those of *E. Engelmannii;* the former never has rays, and the bracts of the involucre are more narrow and pale than in the latter. The bracts of the latter do not seem to be so glandular. From my observation, *E. vialis* is a plant of the lower hills, while *E. Engelmannii* is one of the mountains.

My first specimens were obtained on Skinner's Butte which is situated between the city of Eugene and the Willamette river, both being just north of Eugene. In the open woods at the summit, under the Douglas firs, the species is not uncommon. Some six miles south of Eugene, on the base of Spencer's Butte, in similar locations, I have collected it this summer.

This proposed species is so named, due to the fact that all my collections were made from plants that were growing about paths and roads either in open wooded areas or along the banks facing the Willamette river.—R. V. Bradshaw.

Eugene, Oregon.

REVIEWS

Britton and Millspaugh's Bahama Flora*

For nearly twenty years the authors of this volume or their immediate associates and predecessors have carried on one of the most exhaustive botanical exploration schemes ever planned. Covering more than 29 islands, 661 cays and hundreds of smaller rocky points in the sea, their explorations have been very thorough. The islands are scattered on a long axis of over 600 miles, and comprise in all about 4,400 square miles. Surrounded by considerable depths, "there is no evidence that there ever was land connection with either Florida, Cuba or Hispaniola," although some of the present islands may have been connected.

This group of islands, none over 200 feet above sea-level, contains 995 Spermatophyta, 33 ferns and their allies, and the mosses, fungi, lichens and algae bring the total up to 1,982 species. Of these 133 are endemic flowering plants, and 52 species of non-vascular cryptogams are also endemic. A single species of *Marsilea*, *M. Nashii* is said to be endemic on page 475, although the authors do not credit the Pteridophytes with any endemics in the table of these in the Introduction.

In such a purely insular flora the proportion of woody to herbaceous endemic species is interesting as it has been recently much under discussion. In the Bahamas woody endemics total 76, herbaceous 53 and parasites 3. Of these the Euphorbiaceae with 15 endemic species, contain a larger number of endemics than any other family on the island. More will be said as to this endemic element of the Bahama Flora in another place as it appears to throw considerable light on the age and area theory of J. C. Willis.

Like the series of manuals which the senior author has already issued, or are in preparation, the present volume is carefully keyed, both as to genera and species; and there are keys to the families. With descriptions of the genera and species, and a citation to place of original publication the book is as complete as one could demand. Due to the mistakes of earlier explorers

* Britton, N. L., and Millspaugh, C. F., The Bahama Flora, pp. i–viii, 1–695. Published by the Authors, New York, 26 June, 1920. Price $6.25.

and the inevitable mixing up of old collections and names, the present volume which for the first time untangles all these threads, makes it possible to know what grows in the Bahamas. To the tourist and traveller the book is invaluable, and it deserves the wide usefulness it will undoubtedly enjoy.—NORMAN TAYLOR.

Small's Origin and Development of the Compositae*

This interesting comparative study was continued through ten years. The main conclusion is that the basal form of the great Composite family is the genus *Senecio*, and that this in turn has been derived from the *Lobelioideae*. The aim has been to present a coherent account of the family considered as a whole. The fourteen chapters, each followed by a bibliography, are: (1) History of the Classification of Compositae, (2) The Pollen-Presentation Mechanism, (3) Its Irritability, (4) Corolla, (5) Pappus, (6) Involucre, (7) Receptacle, (8) Phyllotaxis, (9) Fruit Dispersal, (10) Geographical Distribution, (11) Origin, (12) Miscellaneous, (13) General Conclusion, (14) Story of the Compositae in Time and Space.

The accompanying diagram is an abbreviated form of that given under "Phyletic conclusions." While the usual tribes are kept up reasons are given for separating *Gnaphalium* and related genera from the *Inula* group, now classed together as *Inuleae*. The naturalness of the *Helenieae* is also questioned. The interpretation of pappus as a divided calyx is shown to be misleading; it can only be explained as a trichome structure. Throughout the work geographic distribution is considered in connection with morphology.

"With a little mental effort and a little study of Bergson the student may be able to perceive plants of the Andean *Lobelioideae*, such as *Siphocampylos-Centropogon*, change into *Senecio*." The views of Bergson are thus interpreted: the smooth-flowing stretches of a river correspond to orthogenetic development; the waterfalls are saltations which give rise to the branches or back waters; the river-bed with its sinuosities is the environment. "In evolution by orthogenetic saltation, with epharmosis and

* Small, James. The Origin and Development of the Compositae. 334 pp., 40 figures and maps. New Phytologist Reprint No. 11. London, 1919.

elimination of the unfit exercising a directing and delimiting function on the actual forms assumed by organized life, we have the best of Darwinism, neo-Lamarckism, neo-vitalism, Mendelism and the mutation theory."

The Compositae appear to have been formed with and for the mountains. The facts may be explained on the theory that a yellow *Lobelioid*, starting as an arborescent scrambler

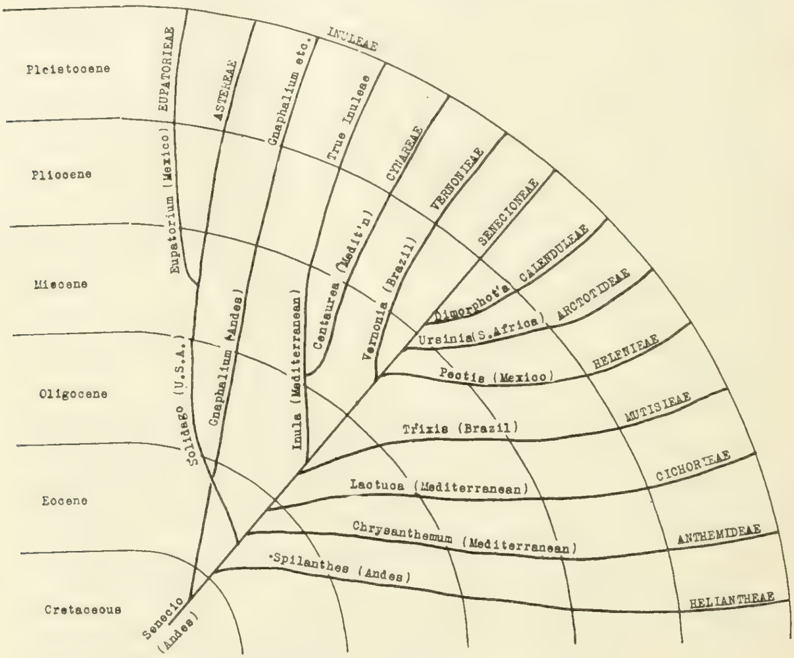

Fig. 1.—Probable evolution of the Compositae (abrikged from James Small).

about the sources of the Amazon, ascended the Andes shortly after their elevation during the cretaceous period. In the higher altitudes the plant became dwarfed, the flowers and pedicels smaller. Orthogenesis crowded the flowers closer, the anther tube became erect, only a few ovules were developed; in short there arose a form essentially like the alpine *Senecio Jacobaea*. So close is the affinity that the author must doubt the dictum of De Vries that "great lines of evolution of whole families and even of genera . . . lie outside the limits of experimental observation."—Alfred Gundersen.

Emile Duchaux's Pasteur: The History of a Mind*

A number of good biographies of Pasteur have familiarized English readers with his life and character. Here, however, another phase of his personality is presented—his mental life, written by his student and co-worker Duclaux. The author's purpose, didactic rather than purely biographical, has been to trace the working of Pasteur's mind in his conflicts with old prejudices and his pioneer development of new concepts; more particularly to show his mode of clear deductive reasoning from facts.

The book appears to have been almost unknown to American and English workers, for whom it has been translated by Smith and Hedges, with a number of interesting additions to the original. The personality of Duclaux, his life and works are described in a vivid introduction by the senior translator, who has also appended a series of brief, characterizing word portraits of persons referred to in the text, with a comprehensive index not present in the original. An unusually complete collection of photographs of Pasteur at various stages of his career has been added.

The book is divided into eight parts, and takes up Pasteur's studies on crystallography, fermentation, spontaneous generation, silkworm diseases, the etiology of microbial diseases, and his development of the concepts of viruses, vaccines and immunity. In each subject Duclaux first gives the reader a clear perspective of the state of the various current ideas and facts then known, and then discusses Pasteur's own researches and concepts—derived experimentally—and the discoveries to which they led. The controversies and discussions with contemporary workers are written in a colloquial, readable style that has been well retained in the translation. The reader is brought directly into the atmosphere of the time—its vague ideas and gropings on the threshold of a new science, which we can scarcely realize in our present development of bacteriology.

Through his close association with Pasteur, Duclaux was

* Translated by Erwin F. Smith and Florence Hedges. W. B. Saunders Company, Philadelphia.

enabled to set forth in detail the questions arising in Pasteur's mind in the course of an investigation, and his methods of answering them by experiment. It is from this standpoint particularly that the book should prove of unique value to the student taking up research in the biological sciences, who wants training in the use of the experimental method and interpretation as practiced by a scientific mind of the highest type, as well as the technique to which most research teachers are solely addicted. It has not the usual dryness of a textbook—the play of logic, suspense and triumphant experiment reads like a Dumas. Duclaux has written a most inspiring and charming book, and it would have been a loss indeed had it not been rescued and rendered available to English readers.—Harry Braun.

PROCEEDINGS OF THE CLUB

March 24, 1920

A meeting of the Club was held at the New York Botanical Garden at 3.30 P.M. Professor R. A. Harper presided. There were 19 persons present.

The minutes of the meetings held February 25 and March 10 were adopted.

Mr. Ludlow Griscom and Mr. Elba E. Watson were proposed and elected to membership.

The appointment of Dr. Michael Levine as Chairman of the Field Committee, instead of Dr. F. W. Pennell, was announced.

The scientific program consisted of a discussion by Mr. Norman Taylor of the flora of Mount Marcy, New York, above timber-line. Twice during the season of 1919 did Mr. Taylor, in coöperation with others stuying the vegetation of the state, visit the summit of Mount Marcy. Timber-line was noted at 4,300 feet altitude, and the factors controlling this were considered. Various floras occur on bog land, dry slopes, rock outcrops, etc., and a list of all species seen were made. This was compared with the list made about 1880 by the late Dr. C. F. Peck.

Only 67 species were found above timber-line, and of these

only 16 to 20 may be counted true alpines. The majority are species of the lowland which have now passed above the spruce forest.

Francis W. Pennell,
Secretary.

April 13, 1920

A meeting of the Club was held at the American Museum of Natural History at 8.15 P.M. President Richards presided. There were 18 persons present.

Mr. V. C. Dunlap, Mr. E. M. Gilbert, Miss M. B. Greenwood, Mr. T. R. Greer, Mr. G. T. Harrington, Mr. Emil Heinold, Prof. W. W. Rowlee and Mr. H. E. Stork were proposed for membership and elected.

Mr. O. F. Burger gave an account of "Spoilage of Fruits and Vegetables in Storage and Transit"; and Mr. O. F. Meier discussed "Spoilage of Vegetables." Both discussions were illustrated.

The discussions considered the organisms causing trouble, especially fungous parasites and saprophytes, and the methods of controlling these. The subject was presented in clear, non-technical terms.

Francis W. Pennell,
Secretary.

April 28, 1920

The meeting of April 28, 1920, was held in the Morphological Laboratory of the New York Botanical Garden at 3:30 P.M., with Dr. F. J. Seaver as chairman. Eleven persons were present.

Minutes of the meetings of March 24 and April 13 were read and approved.

The resignation of Mrs. T. W. Johnston was read and accepted. The acting secretary announced the death of Mr. F. W. Bruggerhof, the late president of the J. M. Thorburn & Co.

The following persons were proposed for membership and were elected subject to the approval of the committee on membership: Mrs. L. J. Gold, 263 East 197th St., New York City; Miss M. Hathaway, 110 Morningside Drive, New York City;

Dr. Claude E. O'Neal, Ohio Wesleyan University, Delaware, Ohio.

The scientific program consisted of a paper by Dr. P. A. Rydberg under title of "Rearrangement of the Genera of the Tribe Galegeae of the Family Fabaceae or Papilionaceae," of which an abstract follows:

"The tribe *Galegeae* has been divided since Bentham's time into seven subtribes. Of these *Psoralieae* was some years ago taken out as a tribe. It contains *Psoralea*, *Amorpha*, *Parosela*, *Petalostomon*, and several related genera, characterized by the foliage, which is glandular-punctate, and the pods, which are one- or few-seeded, usually indehiscent but rarely breaking open irregularly across the middle, never valvate. Another subtribe, the *Indigofereae*, should also be removed as a tribe. The genera belonging to it (of these only *Indigofera* is found in America) have three characters seldom found elsewhere in the Fabaceae, and never combined in any of the tribes of that family, viz. Malpighian hairs on the foliage, appendaged connective in the anthers, and lateral spurs on the keel-petals.

"The other five subtribes should probably remain in the *Galegeae*. Of these *Brongniartieae*, consisting the genera *Brongniartia* and *Harpolyce*, is rather natural and based on the erect, stalked, and distinctly strophiolate seeds, a character rather unusual in Fabaceae but very common in Caesalpiniaceae.

"The other four subtribes are very artificial. The *Tephrosieae* are distinguished from the rest by the terminal instead of axillary inflorescence, but the inflorescence in the principal genus *Cracca* L. (*Tephrosia* Pers.) is very variable. In about half the species the racemes are strictly terminal, but many of these species have additional axillary racemes in the upper leaf-axils. In others a bud in the uppermost leaf-axil develops into a branch which in turn produces a terminal raceme. This may be repeated several times and the several racemes appear as if opposite to the leaves. In a few species the racemes are borne obliquely, neither opposite nor exactly in the axils, and it is hard to tell if they are really terminal or axillary. The subtribe contains five genera, four native and one introduced. Of these the last,

Galega is closely related to *Cracca; Peteria* is less closely so, while neither *Barbiera* nor *Kraunhia* (*Wisteria*) should be placed in the same tribe. The presence of two bractlets under the flower would indicate that *Barbiera* is related to *Sesbania* and *Diphysa* among the *Robinieae*, although the structure of the pod is different. *Kraunhia*, notwithstanding the terminal racemes, is very closely related to *Robinia* and should either be transferred to the *Robinieae* or else form with the Asiatic genus *Millettia* another subtribe.

"The subtribe *Robinieae* is distinguished from *Coluteae* and *Astragaleae* by its one-celled, two-valved, flattened not inflated pods, but in the genus *Diphysa*, just referred to, the exocarp of the pod is inflated and forms two lateral bladders, and in *Homalobus* and *Kentrophyta*, segregates of *Astragalus*, the pod has all the characters assigned to *Robinieae*. *Robinia*, *Olneya*, *Benthamantha*, *Lennea*, *Willardia*, *Hebestigma*, *Gliricidia*, and *Poitea* form a very natural group, the true *Robinieae*, with truly axillary racemes, flat, two-valved pods and odd-pinnate leaves. *Corynella*, *Notodon*, and *Sabina* form also a group with similar pods, but the leaves are abruptly pinnate and the flowers are borne in fascicles on short leafless branches axillary to the leaves of the preceding season. *Coursetia* combines characters of the two groups, some species having odd-pinnate, others abruptly pinnate leaves. Probably these could be segregated into two genera.

"The remaining genera of the *Robinieae* should be removed; they have bractlets under the flowers and characters in the fruit which do not suggest the fruit of *Robinia*. Of these *Diphysa* stands next to *Robinia* in the structure of the flowers and the leaves which are odd-pinnate, but the fruit is very peculiar, the pericarp separating into two layers, the exocarp which becomes bladdery, and the endocarp which is close-fitting to the seeds and constricted between them so that each seed is in a separate chamber. This may constitute a subtribe to itself. The rest, *Sesbenia*, *Daubentenia*, *Agati*, and *Glottidium* form a natural group with abruptly pinnate leaves, bractlets under the flowers and the fruit with more or less distinct cross-partitions between the seeds.

"The subtribe *Coluteae* is distinguished from the *Astragaleae* by the hairy style, a character which in *Robinieae* is barely counted of generic value, while in some species of *Astragalus* the style is hairy just under the stigma. *Colutea* and *Sutherlandia* have escaped from cultivation in the southern states and Mexico.

"As to the subtribe *Astragaleae* the author had not gone over the field enough to suggest any rearrangement. As treated in Engler and Prantl by Taubert it contains only three American genera, *Astragalus*, *Oxytropis* (*Aragallus*) and *Glycyrrhiza*. Even if these should constitute a subtribe the first genus at least must be broken up, for two of its segregates, *Homalobus* and *Kentrophyta* (both American), as already stated, have flat one-celled, two-valved pods as in *Robinieae* and the former has the habit of *Benthamantha* of that subtribe. In *Hamosa* another segregate, the pod is flat but longitudinally two-celled, and in *Atelephragma* rudimentarily so. Whether these genera or some of them should be transferred to the *Robinieae* or the two tribes merged, requires further study to decide. If these subtribes are to remain as heretofore, other distinguishing characters must be found."

Adjournment followed.

Marshall A. Howe,
Acting Secretary

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